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THE AMERICAN GAS LIGHT JOURNAL

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PUBLISHING OFFICE No. 32 PINE STREET

DEVOTED TO THE INTERESTS OF ILLUMINATION, VENTILATION, WATER SUPPLY AND DISTRIBUTION, & GENERAL SCIENCE.

VOLUME LIV.—No. 21. Whole No. 833. | NEW YORK, MONDAY, MAY 25, 1891. | $3 PER ANNUM, IN ADVANCE.

A. M. CALLENDER & CO., Proprietors. C. E. SANDERSON, Manager.
JOS. R. THOMAS, C.E., Editor. T. J. CUNNINGHAM, Asst. Editor.

ENTERED AT THE POST OFFICE AT NEW YORK, N. Y. AS SECOND CLASS MATTER.

Published on each Monday of the year, at No. 32 Pine Street, N. Y.

Terms of Subscription, Including Postage.—For the United States and Canada, $3 per annum. European countries, $4.50 (19 shillings—22½ francs). All payments to be made in advance. Single copies, 10 cents.

Remittances should be made either by post-office order, express money order, registered letter, or bank draft on New York, payable to the order of A. M. Callender & Co.

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MR. JOHN GIMPER, whose record at Leavenworth, Kas., and Springfield, Mo., while managing the gas plants at those points, was little short of brilliant, has resigned from the named posts in order to accept the management of the Galveston (Tex.) works. He deserves his promotion, and is bound to repeat in the Lone Star State the success that he made in Kansas. He assumes his new duties on June 1st.

[Special Telegraphic Editorial Correspondence.]

THE WESTERN'S OUTING AT LOUISVILLE.

LOUISVILLE, KY., May, 20, 1891.

Dear JOURNAL:—The prophets who predicted lack of comfortable quarters at Louisville for the Western's members and guests are pretty busy just now "explaining" their failure, but as everybody seems satisfied it goes that the croakers are forgiven and their forebodings forgotten. The hotel accommodations, and the meeting room as well, are in every way first class, and the Local Committee certainly are fully entitled to all praise. Barret's grin (for it cannot be called anything else) is in fine working order, and the Long folks are also smiling—sometimes audibly—the grins and the smiles being chargeable to the implied and expressed doubts that they were not able and willing to take care of the gas men who were to visit the Falls City. And now to business.

President Egner, as calm and unruffled as though there never had been such a thing in his history as the falling in of a retort house roof—I presume you have some account* of the accident at the Laclede works last Sunday—was greeted by a rousing assemblage, and the reception accorded him was one that the man from St. Louis will often remember with pleasure and pride. His "big" lieutenant—big both in body and methods—Secretary Littleton, actually blushed through that seeming fierceness of his when the boys turned their attention to him. The rain pattered merrilly, but it was not of that dull, dripping nature that causes one to feel blue. "Did the members take the Secretary's word and the JOURNAL'S, too, that everything would be all right at Louisville?" Well, put it right down that the first day's attendance was as numerically large and representative as any in the history of the Association. Some were missed, and greatly, too. For instance, ex-President McMillin, whose narrow escape from death is often mentioned, had not sufficiently recovered from his injuries to be present with those whom he liked so well to mingle with; and gentleman "Ben." Chollar had to remain in St. Louis, for Master and Man could not be spared at the same time while a section of their benches had no better roofing than that usually given to coke ovens. He was on the paper list, and I fear we will not have his conclusions put before us. Another absentee was Watts, of St. Louis, but his paper was well read by the bright light from Georgia, Mr. Boardman. The Watts' paper puts out some very hard facts in a very clear way, and it is a pity that the author was not present to the end that his statements could be intelligently discussed.

President Egner's address† was an admirable document, as it was sure to be. He took hold of his various themes with strong grasp, and I was particularly impressed with the force of his reasoning in support of Gas Commissions—that puts me in mind of the presence at the meeting of Commissioner Barker, President Turner, of Charleston, and Mr. Carroll, of New Orleans—and his utterances in respect to electric lighting. Take it all in all, it more than answers the expectations that were held in advance of it. The papers read to-day were those by Messrs. Dunbar, Gimper, Tracy, Watts and Jenkins, and they were all really entertaining and instructive. I might also say that your esteemed contemporaries are here pleading the baby act, and they evidently have been laying pipes for some time back, but, as it looks now, the Association will tell

* See page 748, second column, bottom. † See page 738.

them to act like men. I tell you, the West seems to be a very poor place for whimperers and know it-alls. Deeds are what count out this way, although Ohio might be noted as a possible exception. Words have a certain valu" in the Buckeye State. At least a score of Easterners are here—prominent among whom are Messrs. Slater, Harbison, Humphreys, Leach, Walton Clark, White; McFadden, Hayward—but I could fill a couple of columns, almost, with their enumeration. The Western and Southern representation is perfect, and we are all enjoying ourselves hugely. I will forward you another budget to-morrow.—***.

LOUISVILLE, KY., May 21, 1891.

In accordance with my promise, I forward you some account of the second day's business, which was most interesting and enjoyable. It was Prichitt's turn to-day to receive a most enthusiastic welcome. The veteran took it like a Roman. He is surely a good one. The result of the members' "round-up" showed that 135 were on hand, which I think beats the attendance record for the Western; and 30 new members were put on the roll. How does that appeal to the old hunkers who say to their engineers, "Stay at home; these meetings are of no value?" An addition of 11 per cent. to the membership list at one gathering of an Association which was celebrating its 14th birthday! From the looks of it the hunkers will soon occupy the stand taken by the one intelligent juror. As was feared yesterday, Mr. Chollar's paper was not read. As was also intimated in my former budget, your esteemed contemporaries were "spanked," and well spanked at that. Perhaps it will do them good—make men of them, maybe! The officers chosen were:

President—Ed. G. Cowdery, Milwaukee, Wis.
First Vice-President—Byron E. Chollar, St. Louis, Mo.
Second Vice-President—E. H. Jenkins, Columbus, Ga.
Secretary and Treasurer—A. W. Littleton, Quincy, Ills.
Board of Directors—W. H. Odiorne, Springfield, Ills.; K. M. Mitchell, St. Joseph, Mo.; I. C. Baxter, Detroit, Mich.; I. S. Post, Chattanooga, Tenn.; Jerome Penn, Washington, O.; William Wallace, Lafayette, Ind.; A. H. Barret, Louisville, Ky.; A. L. Miller, Omaha, Neb.; and W. J. Johnston, Fort Smith, Ark.

Detroit was chosen as the place for next meeting. The whole meeting so far, and it is at end in respect to the technical portion, has been a continuous success, no matter from what standpoint one looks it over. Egner made a model presiding officer, and routine work went along smoothly, frictionless. The rain of yesterday gave way to sunshine and heat to day, and the city is at its best, and a pretty city it is. A great many visitors are here, and the place actually swarms with charming girls and handsome matrons. To morrow the first plunge in the Mammoth Cave is to be made, the second dip to be taken on Saturday, and from what one hears regarding the intent of the members, it looks that the great majority are going to chance it twice. Nothing that the Local Committee could do for our greater comfort and pleasure has been overlooked, and they deserve and are getting the cheeriest of good words and the loudest of praises. I desire especially to thank them and the officers as well for many courtesies and attentions. Now for a rest to fit us for our jaunt to the great cave underneath the blue grass roots.—***.

The Market for Gas Securities.

The market for city gas shares was anything but animated during the week, although values did not suffer greatly. Consolidated opened today (Friday) at 98¼ to ⅜, and was in some demand. Dividend week is close at hand, and much speculation has been indulged in the last month or so as to whether the rate would be raised to 6 per cent. per annum, well-informed sources holding that the advance would be made. If the rate is not increased shareholders may be confident that the money was earned at all events. Further, it would not occasion great surprise were the Company to authorize a concession in gas rates before many months. Equitable and Mutual shares are firmly held. In Brooklyn the rate muddle under the State laws is as unsettled as ever. At an informal meeting of the Presidents of the various Brooklyn Companies, held this week, opinions from the attorneys of the seven Companies were read and discussed. It appears that five of the lawyers held that the Companies could charge $1.50 per 1,000, the other two holding that the $1.25 rate must prevail. In any event, the matter must speedily be determined, and it looks that those who favored consolidation are likely to carry the day. In the meantime, although the shares show no recovery over the rates quoted last week, there is no panic symptom in the situation. Shares are offered at the following: Brooklyn, 105; Citizens, 90; Fulton-Municipal, 122; Peoples, 85; Metropolitan, 98; Nassau, 140; Williamsburgh, 125. Laclede common is weak, at 15 to 17, and Bay State is lower, at 59. Chicago gas is at 50¼ to 51⅛, and Baltimore Consolidated is off, to 44¼–45½. Payments on account of Cincinnati Company's new issue are now in order. The details of the distribution will be found in our item columns.

[OFFICIAL REPORT.—REVISED BY THE SECRETARY.]

FOURTEENTH ANNUAL MEETING OF THE WESTERN GAS ASSOCIATION.

HELD AT LOUISVILLE, KY., MAY 20, 21 AND 22, 1891.

FIRST DAY—MORNING SESSION.

The Western Gas Association began its Fourteenth annual meeting, at the Galt House, Louisville, Ky., on Wednesday, May 20, 1891.

The President, Mr. Frederic Egner, Engineer of the Laclede Gas Company, St. Louis, Mo., called the meeting to order at 10 A.M.

The calling of the roll of members was postponed until the following morning.

On motion, the reading of the minutes of the last annual meeting was dispensed with.

The President then read the following address:

PRESIDENT'S ADDRESS.

Fellow Members of the Western Gas Association: Our By-Laws direct, in Article I., that "At each annual meeting the President shall present an address, setting forth his official acts, and such general items and recommendations as he may deem of advantage to the Association."

Your kind attention is asked while your President will fulfill this requirement.

The "official acts" consisted: In writing to many members of this Association; inviting contributions of papers to be read at this time; answering communications about various gaseous subjects; addressing the directors and other officers for opinions and suggestions relative to matters connected with the welfare of this society, and the success of the present meeting in particular; visiting Louisville in February last, in company with several members of the executive committee, and holding a consultation with the chairman of the local committee, on business connected with this gathering; the appointment of the usual committees, which will be announced later on; the preparation of this address, containing the "items and recommendations which are deemed of advantage to the Association," and which are now respectfully presented and submitted to your consideration.

Turning to the preamble of our Constitution, we find the aims and objects of the Western Gas Association set forth as follows: "Whereas, the manufacture and sale of gas for illuminating and other purposes has become one of the leading economic interests of the country; and whereas, it is necessary, in order that its use shall not only continue at the head of all agents for the various purposes for which it is already employed, but that its sphere shall be extended into newer and wider fields of usefulness; and whereas, it is absolutely necessary that those to whom its manufacture is entrusted should endeavor by every means within their power to reduce its cost to the lowest practicable point, thereby meeting the just expectation of the consumer, as well as those having capital invested in its manufacture and distribution; and fully believing that united action on our part for mutual improvement will be an important step towards accomplishing so desirable a result, we do hereby ordain and establish the following," and then follow the several articles of our Constitution and By-Laws.

The questions which we may fairly ask ourselves to-day are: Have we accomplished the objects of our organization? and, if not, what remains to be done? According to my view of the matter, we have done much toward the realization of our aims; but the greatest obstructions, not only to cheap gas, but also the best interests of capital, remain still to be dealt with; and these I propose to bring to your attention, and could wish that not only the Western Gas Association, but all people interested in gas—be it as producers or consumers—could hear my words, and seriously reflect upon the subjects to be discussed.

Thirteen annual meetings have we had. At each of these we have been favored with the ideas of able, practical gas makers and scientific men in the presidential chair, as well as on the lecture platform, about old and new methods employed to make, improve, deliver and use gas to the best advantage; how to do it, and how not to do it; how to keep our accounts; how to overcome difficulties of every conceivable kind, until the subjects seemed, to some, about exhausted; though they are not that quite, but only a little worn. On this occasion I shall not presume to venture to instruct you as to what—according to my observation and experience—you ought to do to get more and better gas per unit of material used or labor employed; believing that you all are better informed upon the local conditions and requirements of the same, to enable you to produce the most desirable results for your companies, than I possibly can be. And we know that some of us have decidedly

fixed opinions upon the subjects embraced in a gas maker's daily practice, as applied to our special situation.

Let me say to you, that I believe that the most of us have succeeded in bringing the cost of making and delivering gas down to the lowest feasible point, subject only to further reductions in the cost of material, wages, or by as yet undiscovered means of producing the article; and that those who have not done all this know how, and are getting there as fast as circumstances will permit. Let it be remembered, too, that in a country of the extent of ours, and as represented in this Association, the greatest diversity of local conditions exist, such as none but the American gas engineer has to contend with: and these affect all general rules and results to a certain extent; but all are alike affected by the two greatest obstacles to cheap gas and financial stability of gas investments, which it is my intention to now bring before you. They are over-capitalization and the professional opposition company. These are concomitant evils, but there is an excuse and a good reason for the existence, if not the continuance, of the former, because many great, useful and important enterprises could never have been started when they they were first proposed, if it had not been that particular advantages were offered to those who were willing to take all risks and be first to extend the necessary financial support. Over-capitalization is, or was, enabled to live and thrive by the grand opportunities and temptations to quickly accumulate great fortunes, which our rapidly growing country afforded in the past, as at the present time, to those who have some means at their command and are possessed of a little foresight and common sense. Over-capitalization, however, is a standing invitation to that other enemy of cheap gas and the stability of gas investments—the professional opposition company.

It is, indeed, a constant threat and danger to investors of money in gas securities; an unceasing scourge of the employees of a company afflicted by it; and a burden to the community who deal with the same.

It is true that the phenomenal development of the United States during the past 60 years not only made over-capitalization possible and extremely profitable to the operators, but it also produced the causes by which the purchasers of these largely watered stocks and bonds gained instead of lost money. Think of Chicago, which 60 years ago was an unknown Western village, and to day is a well-built city with over 1,000,000 inhabitants. With such phenomenal growth of cities, it is only a matter of a short time when the business of even a heavily over-capitalized company will catch up with its capital.

Other examples could be mentioned of scarcely less remarkable growth. But although the development of the country is unchecked—aye, greater than ever—the conditions which had permitted over-capitalization in the gas business, and made it safe in the past, have encountered a serious obstacle, and the first genuine competition which illuminating gas had had, namely, the electric light.

Every well-informed gas engineer knows that as yet electricity for light, heat and power cannot be produced, distributed and sold as cheaply as good illuminating gas can be for like service, and with the same return on the money actually invested. Still it can be sold in successful competition with gas made at works capitalized very much above their real value; and that is one of the important stubborn facts which should not be forgotten in connection with other advantages of the electric light.

It is now well known that the money made due to electric lighting, was acquired mainly by the organization of "companies" and the manufacture and sale of apparatus. Do not misunderstand me. I have no desire to depreciate the useful and wonderful applications of electricity. There is room for gas and electric lighting in this world of ours; and it is safe to assert that since the advent of the latter, more gas has been used than ever before. But now, having had some years of practical experience with the once new light, we may be pardoned if we cease the unqualified praising and puffing of our—one time by some so dreaded—competitor, and let it take its proper place in this commercial world of ours. Trustworthy information given me by well-known leading managers of gas and electric lighting works, and my own knowledge of the subject, enable me to assure you that, excepting far better prices can be obtained for lighting by electricity than are now the rule, there is no money in it for honest investors.

Electric lighting is well enough if you can get fair prices for it. But many of the contracts for lighting cities by electricity were sought for, obtained and accepted at figures which barely covered the cost of production, and left nothing for subsequent repairs or renewals; and all this, with the sole purpose—too often successful—of intimidating the gas companies into purchasing the outfits at a price much greater than the reasonable first cost of the plant, in the mistaken belief that thereby they would save their business. Most people, having made a mistake, do not like to admit it, but these are facts which cannot be truthfully denied. Nor is the electric light furnished anywhere—that I have heard of—as cheaply as gas light of equal power. It is, however, still to many a comparatively new thing, but the gas maker need not fear the ultimate result. I repeat, that electricity cannot be sold nearly as cheaply, for like service and with the same return on the money actually invested, as can gas. Do not be deceived any longer, but meet electric lighting competition in the only proper and successful way in which that can be done—namely, make good gas and sell it cheap.

An electric lighting plant can be erected with less capital than a ga works. It is not likely to be as objectionable to its neighbors as the latter. Every factory, store, or office building with sufficient steam power can (and in many cases does) furnish its own electric light. And if the gas companies of the world were to day to acquire all the electric lighting plants in existence, they could not prevent the immediate introduction of others; therefore, the sum of the matter is this, that the sooner gas companies recognize the fact that we have arrived at an era when gas must be sold at no higher a price than a fair return on the capital actually invested will warrant—making, of course, due allowance for renewals and improvements—the better it will be for all concerned.

It seems to me that I have said enough to show why over-capitalization can no longer safely be indulged in, and that those who have not already done so had better get rid of this dead, unproductive weight. Happily the rapid development of this country, to which I have referred before, makes this a comparatively easy task, and makes it possible for all who have not yet done it to eliminate the water from their stock without loss to anybody.

But really cheap gas is not possible until over-capitalization is made impossible, which again would be largely brought about if the people themselves, through their chosen representatives in the legislative halls of the land, would make the other obstacle to cheap gas—the professional opposition company—equally impossible.

I will try to illustrate these facts by telling you a little story. About twelve years ago I was connected officially with a gas company in old Virginia. It was the custom of an aged director of the company to pay daily visits to the office, and on one of these occasions, having been asked how he felt that morning, he replied that he felt very badly. Upon further inquiry we learned that the poor old gentleman was enjoying good health, but was expecting that very day to receive $30,000 which he had invested in 3 per cent. United States bonds, and which the government had called in. Now, he did not know what to do with the money, and this was the cause of his unhappiness. That same wealthy director was never satisfied with anything less than a dividend of 12 per cent. on his gas stock.

After this occurrence I asked him one day to please explain to me why he thought the investment in government securities at such a low rate of interest better than his gas stock, and he replied that it was because of the risk he was obliged to take with the latter. That is a point for the people to consider. Take away the risk, and capitalists will be glad to invest in gas works at a much lower rate of interest than is now the rule, and gas will then be sold at greatly reduced prices. Had this director and his colleagues been satisfied with 6 per cent. instead of requiring 12, gas could have been sold—figuring on the actual sales of that year and the capital stock of the company—at about 40 cents less per each thousand cubic feet. And, on the other hand, had the company been secured against professional opposition raiders by the greatly interested and often kicking people who had the power to do it, it is more than probable that our director would not only have been satisfied with 6 per cent., but with less. Thus gas might have been sold at a figure bringing it within the means of all to use it; and with the invariable additional advantage that greater consumption would lessen the cost of production and distribution, thus causing still additional reduction in price of gas until the limit was reached. The company which has been referred to in this story was not cursed with over-capitalization. Its President, one of the wisest and best of men, had been able to prevent proposed schemes to that effect, and the solid prosperity of that company was due to his integrity, foresight, and able management.

As an example of what unwise interested legislation, unchecked capitalization, and unlimited indulgence in pretended competition in gas supply can do, take the city of New York, whose people annually pay more than half a million of dollars for gas over and above the price at which good gas could be sold for there, at a profit not under 6 per cent. on the money required to build and equip gas works to fully supply that city. I am not talking at random in this matter, but am well acquainted with the city and the conditions governing the manufacture, distribution and sale of gas in the metropolis of America. Had the legislature of New York restricted the gas supply of the city to one or at most

two companies only, its streets would not now be filled with a lot of unnecessary pipes, as they are, and gas not only could, but no doubt would, have been sold for little more than one-half the present price.

In considering the baneful effects of the professional opposition company, let us first suppose that some one of you had put the question: "Granted that opposition companies were prohibited by law, would not then the remaining gas companies take advantage of the situation and charge exorbitant prices for their product?" Very likely some would do that if allowed; and, therefore, before further describing the disease, let me propose a remedy, so that we may understand one another better as we go along.

To set the price by law at which gas should be sold is clearly illegal and unconstitutional. It tends to communism, and is hence contrary to the law governing society. It is no more lawful to fix the price of gas than it would be of land or bread; but in granting an exclusive franchise to a corporation the people could fix the rate of interest which the said corporation would be permitted to earn upon its invested capital. Due provision should be made for renewals, improvements, and extensions; and if this plan were adopted by the people, through their legal representatives, the cheapest possible gas would be an assured fact. Nor is that all. The security of money invested in gas undertakings would also be assured; and last, but not least, the employees of gas companies, from the poorest laborer up, would be benefited in the way of hours of work and wages. I doubt if there is a gas company in the whole country which would not gladly accept such terms as I have foreshadowed and will repeat—namely: Accept an exclusive franchise on condition that it should not charge more for gas than would be necessary to pay dividends at the local prevailing legal rate of interest upon the actual value of its plant and franchises, allowing a proper sum for repairs, renewals, improvements, or other necessary expenditures.

Should the further question be put: "Why not let the municipality make its own gas?" I would point to the city of Philadelphia, for instance, as an example of a municipality making its own gas. For there, having maintained gas works for many years, the city at last advertised for private parties to make gas for them; no doubt because it was thought to be cheaper than to continue the old way; and that is now done to a considerable extent, the city delivering and selling gas to its consumers which is made by a private corporation.

Furthermore, many of us are acquainted with the managers of municipal gas works, and we know them to be able gas engineers and upright gentlemen, and in no way responsible for the rumors of political jobbery frequently alleged in connection with the conduct of municipality-owned gas works, especially about election time; which, however, should they be true or not true, ought to deter any patriotic citizen from entertaining the idea that the government of any city or town should also manage its gas works. The functions of the government should be confined to their proper sphere; and going into the manufacturing business, of anything whatever, I think, is not one of these.

The causes of the being of the "opposition gas companies" are so intermixed with over-capitalization that it is not easy to separate them. One thing, however, is certain, and that is that although the saying "Competition is the life of trade" may be true in connection with a drygoods store or the like, it is not true in relation to gas companies. Why not? Why, because when by excessive competition a drygoods store can no longer be made to pay in one place or is bankrupted, the remaining goods can be sold and taken elsewhere. There may be loss, but not utter ruin. When two or more gas companies, however, lay down pipes in the same district, in which one perhaps did not have any too much business, something has got to and generally does happen. Capital will not suffer itself to be annihilated—not easily; and so it has come to pass that the most stringent provision against consolidation, transferring or selling out of charters granted to opposition companies under the most solemn promises previously given to the public to get said charters, have been evaded and broken with great regularity and success.

Shall I take up any of your time by describing a few of the methods employed by the promoters of the professional opposition company? One example will nearly describe them all; but before entering upon such a description let me define our own position, as gas men, in relation to cheap gas and possible improvements in the art of gas making. Which one of you would not gladly reduce the cost of making and delivering gas even the fraction of one cent per thousand cubic feet?

The object of this meeting is to disseminate knowledge; to bring about the more economical production, the improvement in quality, and the most intelligent use of gas. That is what we have all come here for—some of us a thousand miles: To increase in the knowledge of our profession by an exchange of experiences in this hall, and, still more, by means of the informal meeting in the hotel lobbies, to learn, if it is possible, of means and methods whereby we can cheapen our product.

We feel that we have done the best we could to obtain the most desirable results for our companies; but, again, we have spent time and money, and have left the comforts of home, and have subjected ourselves to more or less inconvenience, in the hope that here we may possibly get some new idea applicable to our particular location, and by means of which we may still more reduce the cost of our gas or improve its quality. We have devoted the best years of our lives to the study and practice of making gas. How can it seem possible that we would willfully reject an opportunity, when presented to us, to accomplish the object of our life's work. Gas companies are not charitable institutions; they are in the business for the money that is in it; and no one—according to even popular belief—values the dollars higher than a gas company.

Does it not then seem inexplicable that we, as individuals, and our supposed grasping companies, should willfully refuse to take advantage of methods by which we could cheapen the manufacture and distribution or increase the usefulness of gas? But that is exactly what we are supposed to be doing when we refuse to adopt the imaginary, illusive, claimed-to-be-improved method of some mere tyro in the art of gas making, who, through his very ignorance of the subject thinks he knows it all, after we have patiently listened to him or them, and may be kindly, but unwisely, tried to convince him or them of the impracticability, worthlessness, or perhaps old and well known (to gas men) character of the design brought to our notice. One sure and unfailing sign of the fraudulent character of the new method and its promoters is, that in such a case these parties will not go near any gas company at all, but in the beginning seek moneyed men noted for liberality and public spirit, but with less knowledge of gas the better, and gather them into their net. Many of you have met the fellow who could make so much gas out of a gallon of oil, or a pound of coal, or both, that, according to the demonstrated, undeniable chemical formula, the finished product would weigh—were the statements not barefaced, bold fabrications—far more than the original substances which entered into the combination.

The backers of the new alleged improvement generally believe such rot, and cheerfully, even enthusiastically, venture their money in it, with just this result, namely, another opposition company; and should the matter be carried so far as the building of new works, then history repeats itself without much delay. The people soon pay dividends on an increased capital. The individual dividends may not be as great as before, but the sum total will be found greater, and without reasonable room for doubt much more than had only one gas company, with proper protection and lawful restrictions, occupied the field. Another sort of professional opposition company is that of the parties who really have a good process, but by which gas can be made neither better nor cheaper than by methods previously employed; who, taking note of any company which may be plainly over-capitalized, yet paying regular dividends, single such out for attack, because it is evidently a good field for opposition, only for the purpose of forcing the existing companies to buy them out at a good stiff figure. I think such questionable undertakings ought to be and could be made impossible, to the absolute advantage of consumers and producers of gas—of people and capitalists alike.

In nearly every instance, the results brought about by the establishing of an opposition company are the same: Loss to the investor, even if he was "let in on the ground floor;" loss to the people, who, through the necessity of providing dividends for more capital, lose any benefit which a possible improvement in methods might have brought them; and loss to the workmen, who for a like reason are obliged to take the lowest wages which rigid economy on part of the warring companies and their necessities can enforce. Truly not a desirable object, nor yet a matter the promoting of which—namely, the professional opposition company—should command the best support which press and people can and almost invariably do give it. There have been cases, and there may be others, where, through over-capitalization and tenacious clinging to imaginary values, there seemed to be no help but an opposition company to bring the offending one to its senses. But no matter how much the apparent provocation, the final result in the long run is always likely to be the same. I have, therefore, on the floor of this Association and from the platform, for years urged upon you all to take united action and try to induce the legislatures of your States to introduce measures similar to the Massachusetts Gas Commission, or better methods, if they could be devised, to regulate the gas industry in such a manner as would afford protection to invested capital and dependent labor, and assure the people at large of the cheapest possible gas for heat, power and light.

There is no State in the Union in which it would not be much cheaper for

the gas companies to contribute the means to bring about and maintain a gas commission, to act in the interests of all concerned, than to submit to the frequent—sometimes annual—species of blackmail and pecuniary losses caused by the twin evils which I have now fairly brought before you. You have heard that I am aware that former conditions, rather than men, are responsible for the existence of these obstructions to popular cheap gas and these dangers to the security of money invested in gas works. I have dealt frankly with the subject before you, because I believe it to be not only in our own interest, but especially in the interest of those whom we serve, that these questions should be no longer set aside or glossed over, but squarely met and settled for good—as they must be sooner or later; and I believe the time to do it is now at hand; the means are within your power, if you only have the will to do. There are people who hold that the gas industry does not and ought not to require legislative protection beyond that given by the common law. They believe that if capital employed is not larger than necessary; the apparatus of the most approved pattern; and the management faithful, practical and intelligent—that gas could and would be sold at the minimum price, thus offering no inducement for the formation of opposition companies. That would indeed be true, if it were not for the unavoidable and irrepressible patent crank, whose method of operation I have described. Hence I maintain that suitable legislation is not only desirable, but also very necessary, even under the most favorable aspects of the matter, to assure cheap gas to the public and a just and fair protection of capital invested in gas or electric lighting works.

There are some who believe that gas companies should not take part in any agitation of the kind suggested. I hold that it is their duty to do it. Anything which may protect the stockholders against loss is the duty of the officers who represent the gas companies, who are trusted by the said stockholders with the management of their investments to attend to. And if it is a matter which will so clearly benefit the people at large, as well as the gas companies, and to such a great extent, as the advancing of proper legislation for the mutual protection of all concerned is, then there is every reason for gas companies to lead, because some one must. And if gas companies do not, who can you expect to do it? And, above all, proceed manfully, openly, not underhanded and secretly. With justice on our side, we must win. I recommend that the members of this Association form State committees, and bring the matter before the Governors for their recommendation to the legislatures during this year. I know of no items or recommendations the consideration of which your President deems of greater importance to the whole gas industry at this time than those just gone over.

An account of some of my practical experience during the past year may also interest, and perhaps be of service to you. Speaking of my own work, I tell you about things which I know, and may in a sense be new to you; hence more desirable than repeating such matters as have been printed in the current periodicals, and which you have therefore very likely read.

During the past year we introduced oxide of iron as the purifying agent at our works. As we manufacture about one thousand million cubic feet of gas during a year, you may wonder why we did not do that before. The explanation would scarcely interest you, but I may say that purifying on an average over 25,000 cubic feet of gas per bushel of unslacked lime, as we did, there seemed to be not much of an inducement to change, everything else considered. Shortly after commencing the use of oxide, we began to have a great deal of trouble with our consumer's meters, which stopped registering. The trouble was by some asserted to be caused by the iron oxide. I could not see how the oxide of iron employed in the purification of illuminating gas could have any effect on our meters. Upon examining some of the meters, I found that ammonia was undoubtedly the mischief-maker, and further investigation found how it came there. The remedy was, of course, simple and promptly applied. While purifying with lime the escape of ammonia from the scrubbers had not been noticed, as the lime was used quite wet, which had thus arrested the NH_3; but the oxide did not act that way, hence the trouble with the meters. Had our scrubbers been in good order, no ammonia could have escaped, and of course there would have been no difficulty. Having heard purification by means of oxide of iron charged with damaging the meters, I thought this statement of facts in relation to that matter would interest you.

Since our last meeting we made an extensive trial with the so-called inclined retort benches. A bench of that kind had been on trial and in constant use for over two years at one of our stations, and seemingly worked so well that we were induced to erect eight such benches, with seven retorts in each.

Having been invited to write a paper on this subject, before these benches had been fairly tried, and which was published some six months ago, I will confine myself now to a statement of the results obtained after that time. (See pages 687 and 688, Vol. LIII., of the AMERICAN GAS LIGHT JOURNAL for paper and illustrations). The style of benches which we used are known as the Coze system with the Arndt furnaces. We changed the original design submitted to us, by taking the gas from the upper and back end of the retorts instead of at the lower and front end, as was done at our original trial bench. After overcoming all the practical objections which were raised or occurred to us, against this change, and after we had about ten days' trial with the benches and commenced to feel that we had succeeded in demonstrating that the inclined bench was just the thing we wanted for our future extensions, we encountered an obstacle of such a serious nature as to cause us to let down these benches altogether for a time. The trouble was—pitch in the hydraulic main. This had been gathering gradually, until it shut off the tar overflow and dip pipes. We did not suspect pitch at first, because the hydraulic main was not at all hot, or exposed to intense heat. First the lower mouthpiece of the retorts would smoke; this smoke, together with the fumes from the cellar, would drive the men away, who were at work on the top of the bench engaged in charging the retorts. The retorts would consequently not be charged regularly. We did all that a practical mind could suggest; but many of our men became dissatisfied and left us at the most inconvenient times; and at last some unknown miscreant went so far as to place an explosive under a good 16-inch Mackenzie exhauster, and between the hours of 2 and 3 o'clock in the morning blew up and nearly wrecked that machine. We then let down all but two of these benches. At these we placed a number of reliable men, with instructions to keep the benches going, no matter at what expense for labor—this to see what the benches would really do, if kept going steadily. And this is the best we could do: The retorts gathered carbon rapidly, and required frequent scurfing. We carbonized 415 lbs. of coal per retort in each four hours of the day, and used 18 to 20 per cent. of the coke made in the bench. But to keep these benches going steadily required more labor than would have been needed to handle nearly double the weight of coal in the ordinary bench. My estimate for labor, based upon our first week's work, and which I believed at that time, from appearances, could be still more reduced, was found entirely inadequate after the tenth day of our trial. The furnaces of the benches gave us a fine command of the heats to be maintained. We tried heavier charges, and running the heats down, until the lower ends of the retorts were almost black, and the upper end barely a cherry red; but for all that we got pitch in the hydraulic main in large quantities; and at last dropped the benches, believing that had we built them more like the original pattern, we would have been more successful. As we make considerable oil gas in retorts, we intended orginally to use the inclines for that purpose, should they fail us as coal benches; hence there was no great loss in a financial sense.

When we became satisfied that the benches would not meet our early expectations, it was decided to spend no more money upon them for alterations. But Mr. James Green, of St. Louis, was not satisfied to let the matter drop there; and with commendable liberality proposed to furnish the means to alter two of those benches, so as to conform to the first plans, in order that it could be established, for the benefit of those whom it may concern in general, if the benches were an improvement in any sense or not. When this has been settled beyond any reasonable doubt, you may hear from me again on the subject. I may sey, however, that I believe that benches with inclined retorts will come into general use, as they possess many advantages, but they must be arranged differently than ours are.

Within the past ten months we erected an oil gas plant, on the Pintsch system, at one of our stations, for the purpose of supplying with gas the cars of the railroads which enter the Union Depot at St. Louis. The principal point of interest to me connected with those works was the ready means it afforded for testing all kinds of oil for gas purposes, on a fair working scale. Oil is run into iron retorts; passes through a washer, condensers and lime purifiers, on through a meter into the holder; from the latter it is pumped and compressed by a powerful engine and stored in steel cylindrical storage tanks under a maximum pressure of 220 pounds to the square inch. From the tanks it is delivered, through a double strength ¾-inch diameter pipe line, into smaller store tanks under the cars to be supplied at the depot.

The great pressure maintained in the storage cylinders is reduced by suitable apparatus, so that the gas at the burner is consumed under the ordinary conditions, and with general satisfaction. The Pintsch system is not by any means new, and I will not, therefore, enter into a further description of it; but some results of recent tests made of several kinds of oil at our Pintsch works may be useful to you, and are here given in the form of a short table:

Average Result of One Day's Work.

Kind of Oil Used.	Degrees of Beaume at 60 Degrees Fahr.	Weight of One U. S. Standard Gallon (231 Cubic Inches). Lbs. Ozs.	Cubic Feet of Gas Made per Gallon of Oil Used.	Gallons of Oil Required to Produce 1,000 Cubic Feet of Gas, Uncompressed.	Per Cent of Gas Lost by Compressing to 220 Lbs. to the Square Inch.	Corrected Candle Power of the Uncompressed Gas, Flat-Flame Burner Using about 2.4 Cu. Ft. per H'r.
Pennsylvania crude oil	49	6 10	70.49	14.18	7.7	45.5
Pennsylvania naphtha	66	6 ½	50.90	19.63	12.2	46.0
Lima (Ohio) crude oil	39	6 15	63.16	15.84	11.9	56.2
Lima (Ohio) naphtha	61	6 1	72.15	13.86	11.1	45.8
Results from Mott Haven, N. Y., sent to compare with ours.—Pennsylvania crude oil	Not given.	Not given.	65.20	15 50	12.1	Not given.
One gallon of water weighed at the same temperature and in same vessel as the oil	.....	8 5¼	.....	.....	.....	.....

The photometrical tests were made by Mr. B. E. Chollar, on a bar photometer so arranged that, with the aid of a table designed by this gentlemen, every conceivable photometrical test of the value of gas, in candles, or relative efficiency of burners, can be easily and quickly made by an ordinary clerk. I would recommend that Mr. Chollar be invited to give an exhibition and lecture in connection with his arrangement of photometer at our next annual meeting. I believe such a photometer would be a useful adjunct to the counting room of any gas company, as by its use a grumbling customer could be quickly and easily convinced that often his burners, and not the gas furnished him, were at fault; and you know it is said that "seeing is believing," hence the recommendation.

Fuel gas is a subject which should be full of interest to the thoughtful and progressive gas maker. It has been exhaustively discussed by various writers during the past, and although ordinary illuminating gas, consumed in suitable gas stoves, is known to be by far the cheapest fuel for cooking purposes, the address of the President of the New England Association of Gas Engineers, at the last annual meeting of that society, contained the following opinion, which seemed to accord with the views of most authorities upon the subject: "The extra cost is so excessive that no one seriously thinks of house heating or of steam boiler heating by a distributed gas." That is true, no doubt, as to manufactured gas, in the present state of the art; but suppose that good fuel gas could be made for nothing—that it was to become an unavoidable bye-product in the manufacture of other valuable substances—it could then be sold as cheaply as natural gas now is, and be used for house heating or boiler heating the same as the latter gas. There is nothing so very visionary about it, as you will find by due investigation in the right direction. As an example of difficulties overcome by wisdom and perseverance, consider the metal aluminum; and may we not, with some show of reason, expect a like favorable outcome for cheap fuel gas?

Within the past few months I was called upon, in the discharge of my duties, to investigate a proposed apparatus for the manufacture of sulphate of ammonia and cyanogen salts. These investigations were largely based upon results obtained in practical operations, and were astonishing and encouraging. It does not seem improbable, when we consider the solving of so many formerly supposed impossibilities within late years, but that the science of the chemist and engineer may discover, in the near future, means and methods whereby the nitrogen of the atmosphere may be made of some account in the production of good and cheap fuel gas. The results of my recent investigations impel me to say to you that the subject is worthy of your most thoughtful investigation, and not a thing to be laughed or scoffed at; for by earnest research alone may we arrive at the solution of this problem.

One thing, the value and importance of which it seems to me is not sufficiently appreciated, is the reading—by officers and other employees of gas companies—of periodicals devoted to the interests of the gas profession. A gas company may subscribe to one journal; and that is in most cases the extent of the support given by these companies to gas literature in this country. The wide-awake and progressive superintendent always subscribes to several of these publications, if he can afford it; but other people interested in gas manufacture hardly ever take such a paper to read it. According to my own experience, the money invested in subscription to gas journals has brought better returns than any other investment made. Granted, that there were times when the journals seemed dull and uninteresting; but not a year passed in which I did not get far more than my money's worth back again, through reading the new ideas, records of other men's trials, successes, failures, or suggestions, which were published in the columns of those papers; which helped, cheered and entertained me; and I may safely assert, assisted indirectly to make dividends for my company.

I recommend that this Association adopt the 2,000-pound ton standard, instead of the ton of 2,240 pounds. There is no good reason why we should adhere to a clumsy, inconvenient method of computing our material at tons of 2,240 pounds when it is a fact that everything which we receive by weight and pay freight upon is computed at the rate of the short ton. What if it is an ancient custom to call 2,240 pounds 1 ton? If the world was to be governed by such arguments this convention to-day might be one of candle, and not of gas makers. But the world moves, and we hope we do with it. If others are not using the 2,000-pound ton that is no argument against our adopting such a self-evident, convenient method, used by all our railroads and Western river steamboats, and which is the custom of the greatest portion of our country. Let others, if they wish to keep up with the progress of the Western Gas Association, adopt this, as they have adopted other good ideas originated here, and relegate that inconvenient method of computing a ton with other obsolescent things of this century.

Mr. E. C. Brown and Mr. Geo. W. Graeff, Jr., who are both honored associate members of this Society, have sent to me protests as individual members, as well as in their capacity of editors, in regard to the methods observed by this Association in the publication of our records. Although the officers of this Association have been charged with partiality, the said officers have nothing whatever to do with it, and have done only that which was authorized by the Association, and have declined simply to overstep their authority. Every member of this Association ought to know that. However, I do not wish to take up any more of your time now with this matter, but strongly recommend that a committee of at least five members be appointed, who shall hear the views and arguments of all concerned more directly, or who wish to be heard upon the subject; and which committee shall report their finding and recommendation to this Association to-morrow morning, before any other business is taken up. And I hope sincerely that the subject shall then be finally and satisfactorily disposed of.

There are a number of things I am obliged to pass by without notice in this address, because I fear it is too long as it is; but one very important matter must be brought before you, as it is closely connected with the prosperity of the Association. You have ordered by vote a number of things to be done, which cost a lot of money, and which were not contemplated when this Society was organized; hence it has become absolutely necessary—unless you wish to retrogade—to increase the annual dues. I therefore recommend, after careful deliberation and consultation with other officers of this Association, that the annual dues shall hereafter be five instead of three dollars; and that the admission fee shall be ten instead of five dollars.

Since last we met, some of those who were with us then have passed through the eternal gates which separate our mortal existence from the mysterious hereafter; and we shall not see them again on this side of eternity. When we met our departed friends a year ago at St. Louis, who thought that within another twelvemonth we should be called upon to mourn them within so short a time!

Enoch Veal, born in Bristol, England, August 18th, 1841, passed away at Booneville, Missouri, November 10th, 1890. "The last sad tribute of respect" became due to Ross Woodmansee, of Davenport, Iowa, on the 5th day of December, 1890. Frank Beck, of Galveston, Texas, will meet with us no more; respected and honored by all who knew him, he entered upon a better life on September 4th, 1890. Wm. H. Down, born in the city of New York, on the 9th of May, 1837, was called from labor to rest on the morning of the Sabbath day, February 15th, 1891. Young, popular and beloved, Edwin M. Starr, son of James Starr, entered upon immortality April 28th, 1891. Of him a paper in his native town remarked: "Not within many years has a death in Richmond caused such general gloom or more genuine sorrow."

What can I say in praise and honor of our fellow craftsmen which you do not already know? The families and near friends of these late members of the Western Gas Association have our sincere sympathy, and should be so informed officially.

I will conclude this address by thanking you all for your patient attention.

[To be continued.]

Some Thoughts on Gas Meters.

[A paper read by MR. WM. BARRATT before the Eastern Counties Gas Managers Association.]

The importance of the subject I have chosen must be my apology for appearing before you to-day with this paper. Year after year papers have been read at meetings of Gas Associations on almost every matter connected with the manufacture of gas—on retorts, ascension pipes, hydraulic mains, condensers, purifiers, scrubbers, etc. But comparatively few engineers have treated upon the machine that measures, or is supposed to measure, the gas delivered to the public. True, the late Mr. F. W. Hartley read a valuable paper on "Gas Measurement," at the meeting of the British Association of Gas Managers in Dublin in 1871. Mr. Hartley then gave his reasons against the use of dry meters, and explained his reasons for preferring wet meters. An interesting discussion followed, in which Messrs. Warner (of South Shields), Spice and Anderson (of London), took a prominent part. The subject was not referred to again till 1874, when Mr. Warner read a paper, which will repay perusal, on "Wet Meters," at the meeting of the British Association.

In 1875 the British Association held its annual meeting in the hall of the Philosophical Society, Leeds, under the presidency of our old friend, Mr. James Paterson, F.G.S., of Warrington. At that meeting a paper was submitted by Mr. J. Douglas, of Portsea, on the "Systematic Testing of Consumers' Meters." A very lively discussion followed, in which I took part. Those who wish to understand the vagaries of dry meters will be amply repaid by a perusal of Mr. Douglas's paper, as some interesting statistics were furnished. At the meeting to which I allude, I made the following remarks:

"I did not speak merely as a gas manager, but as having been the meter tester for five or six years for the Corporation of Leeds. During that time 10,000 meters, wet and dry, passed through my office. A long time before I left the service of the Corporation my faith in dry meters had entirely disappeared, for I never found one dry meter that would register the same under all circumstances. Take a 2 or 3-light meter, and test it under 5-10ths pressure, and it might be found to register within 5 per cent. of the quantity it was marked to pass; but pass through that meter from 12 to 18 cubic feet of gas, and it would vary. If 18 cubic feet were passed, it would be from 5 to 6 per cent. slow; if the same quantity of gas were passed through it at a slower rate, it would be found to be what it was alleged to be when sent out from the manufactory. On one occasion I wrote to Mr. Joseph Adamson, one of the first Presidents of this Association [the British Association of Gas Managers], stating there was not a dry meter that had come under my own observation through which I could not get as much gas, without any registration, as that meter was sent out to pass. This statement was communicated to a dry meter maker, who came to me and said he would undertake to make a 10 light test meter that should be absolutely correct under all circumstances. This was arranged accordingly, and a clause was put in the agreement that the meter was not to be paid for until certified by me to be correct. The meter came down, and was put through several tests; but before the testing was over there was a variation of registration, as against the gas company, of no less than 7½ per cent. The firm was never paid for the meter, and that meter is still in my possession. I had then been in my present situation about twelve months. When I first went to Grantham, I tried to ascertain the leakage in the place, and, to my astonishment, found it to be 25 per cent. I was certain that this 25 per cent. could not go through the mains in the streets; and I therefore proceeded to discover the proportion of dry meters to wet throughout the town, when, to my great sorrow, I found that I was up to the shoulders in dry meters. At Christmas last I took the inspector's book and found no less than 20 dry meters standing which had not registered anything for the three months previously. I then went to the rental, and found that there they had not registered one-half the consumption of the prior quarter. At the close of the next three months, the inspector's book showed that ten more meters had stopped; so that, out of 1,400 meters, there had been stopped, in six or nine months, no less than 30. I followed the last-named meters backwards, and found that they had been like their fellows in the quarter before—they had stopped. On the other hand, I must mention that, during the whole of the time, very few wet meters had come under my notice which were not within 2 or 3 per cent. of being correct."

Since making the foregoing statement, I have seen no reason to alter my opinion, except that a more extended experience has caused me to have less faith than ever in dry meters. At the same time, I do not deny that in some places, and under some circumstances, there may be some advantage in having a dry meter.

A short time ago a pamphlet was sent to me by post, and I must confess on reading it I was astonished that such a pamphlet had been forwarded to any intelligent gas engineer or manager. Did the author think that gas managers in the Eastern Counties had prepared themselves for a six months' incarceration in Bracebridge? or that they had bid good-bye to their common sense? or that they had thrown their judgment and experience on the neck of chance? I regarded the pamphlet as an insult to us all. It contains little that is new, and much that is contradicted by everyday experience. The author states that, under certain conditions, a wet meter can be adjusted to measure accurately; and every manager of gas works, worthy of the name of manager, knows well and sees that the conditions are complied with. Here the fact is admitted that a wet meter can be made to register correctly; and this is more than I dare to say of a dry meter. It is stated that wet meters are used for experimental purposes with the photometer. This being admitted, why, if the dry meter is the best, the most accurate and the steadiest when at work, is not a dry meter used for testing purposes? This is rather significant. But let me go further, and let me ask if it is not true that every test-holder passed and stamped by the Government Department is, without exception, a wet meter. Then we are told that gas companies using wet meters exclusively may lose 10 or 20 per cent.; but it may be said with equal truth that they may not. In my own case I am sure I do not; and I believe there are other companies who do not suffer by their use. Then, again, we are told that it can be proved, from the books of certain companies, that a very large increase of gas rental is caused by substituting dry meters for wet. The books of my Company prove the reverse, as our rental has increased by substituting wet for dry meters; and, further, the price of gas has been reduced from 5s. per 1,000 cubic feet to 2s. 6d. per 1,000 cubic feet, at which price it stands to-day, and we do not deliver a less quality than 16 to 17 candles. Then, as to the recent frost, we have about 2,000 meters in use in the town; and out of this number only from 2 to 2½ per cent. caused us any trouble, and in many cases we found it was the service pipes that were at fault, and not the meters. We had no station without gas; no churches, chapels, or public rooms. Give me a good wet meter, and I will run the risk of deficient services.

But it may be asked whether dry meters do not register fast as well as slow, and whether the one does not balance the other? I answer, "Certainly not." If this were the case, the element of unfairness to the consumer would come in. No company should depend upon averages for their revenue. It would be immoral to continue to work under such conditions. What right have we to make Mr. Jones pay for Mr. Brown? Is there anything more calculated to cause dissatisfaction than a system of this description? The man who attempts to work it is not wise. A customer of mine became dissatisfied with his wet meter. He thought it registered too much, and expressed his desire to have a dry meter in its place. I ordered the meter to be changed. A few months afterwards I met this customer; and he then informed me that his gas bill was larger than before, and that he should like his old wet meter back, which was done.

But I am told all objections can be overcome by a constant and systematic testing of dry meters. On the assumption that this can be done, what will be the cost of furnishing a room with a test holder and all its fittings? Our friend, the President, and perhaps a few others, might be able to do this; but it is beyond the power of others. If they cannot get the necessary apparatus, what are they to do? Their only plan would be to send the meters to the nearest testing station and have them tested, and if correct, returned. But if found incorrect, what then? They would require to be sent to a meter repairer, and that means a pretty little bill. Why are we to have this inconvenience and cost with dry meters when we can have a meter that does not necessitate such trouble and expense? There can be but one reason, and that is to keep dry-meter manufacturers in work repairing their own meters.

A great deal of sympathy is professed for our friends in the North; but I am quite sure they are wide enough awake to take care of themselves. Mr. Johnson, of London, stated, at the Leeds meeting in 1875, that "the wet meter was undoubtedly the most accurate instrument. It could always be depended upon; and he scarcely knew an instance in his experience, with 1,000 or 2,000 he had tested, in which a wet meter

had allowed gas to pass unregistered." Mr. Helps, of Bath, stated that "during the last six months the trouble and worry they had had with stopped dry meters was something more than he could tell; sometimes the thing had continued for two or three quarters without notice of the inspector. There was not only the loss thus occasioned, but the discontent engendered among the consumers, who could hardly be persuaded to believe they had gas which had not been registered." Mr. Foulis, of Glasgow, said that "he had in his city something like 160,000 meters, 75,000 of which were two-light meters. Five years ago he had no less than 20,000 dry meters numbering nothing. Half his meters were wet and half dry; and he was perfectly certain that, for every single wet meter taken down for non-indication, he took down ten dry meters. During every inspection, 30 or 40 dry meters were brought in daily, simply for doing nothing, though very often the mere shaking of them would make them all right. He had no hesitation in saying that small dry meters were a very great source of loss."

Evidence like this, coming from such practical men, is worth tons of pamphlets sent from interested dry meter makers. But no matter where they come from, my experience tells me there is little difference between the instruments of different makers. I believe one is as good as another.

After forty years' experience, such as few men in the profession could have had, I say, "Give me a good wet meter and a good inspector, and I shall obtain all the gas I make within 6 per cent.; and if so I shall be able to supply gas at 2s. 6d. per 1,000 cubic feet." I have not written this paper with the intention of exhausting the subject, but to provoke a good discussion; and I hope every man who has anything to say will now say it, or forever hold his peace.

Incandescent Gas Lighting.

By W. Mackean, F.C.S.

[The following is the complete text of the paper on "Incandescent Gas Lighting," an abstract of which was previously given in our columns. It is printed in response to several inquiries.]

The pure atmosphere, the steady, brilliant light maintained where electric light is employed are so much in advance of the unpleasant atmosphere and unsteady flame resulting from the use of coal gas, that it is not surprising electric light is so much more appreciated; but when we come, however, to consider the cost of electric light compared with that of coal gas, the high price of the former at once gives coal gas such an advantage as to almost defy competition for ordinary household illumination.

Nevertheless, a demand has sprung up to obtain a higher standard of illumination from coal gas which shall, as far as possible, possess the many advantages of electric light in point of brilliancy and steadiness, and maintain a comparatively cool atmosphere.

The production of light for illuminating purposes by the incandescence of refractory materials, such as platinum and iridium, or the oxides of zirconium, magnesium, etc., is not entirely new, but their adoption for ordinary household illuminating purposes has only recently been attempted with any degree of success. Several forms of lighting by incandescence have already been brought before the public, among the most important being the Welsbach, Clamond, Lewis, and Sellon.

In the Welsbach system a hood or "mantle" composed of the oxides of the rare earths, such as zirconia, thorina, yttria, etc., is employed, which is prepared as follows:

A cotton thread is knitted into a cylindrical shape in network form, washed first in dilute ammonia, then in water containing a little hydrochloric acid, finally in distilled water, and dried. The knitting is then cut up into suitable lengths, saturated in a solution of the lighting fluid, composed of the nitrates of zirconium, lanthanum, thorinum and cerium, and dried on glass rods at a temperature of 90° F.

A fine platinum wire is then passed through a double thickness of the net, forming the top, by which means the mantle is attached to a stout steel wire or support. The mantle is then drawn into shape by being pulled over a model of the desired form, and the flame of a Bunsen burner afterward applied to the upper portion of the mantle, which burns slowly downward, and shrinking considerably in length, the cotton being entirely consumed, leaves only a fine network of the oxides zirconia, thorina, etc., which on being placed over the flame of a Bunsen burner at once becomes incandescent, emitting a bright, steady light.

By altering the nature and composition of the fluid employed the light obtained can be varied from an intense white light to a golden yellow or greenish color, which differ to a certain extent in their diffusive power.

The following compositions will give a fair idea of the changes of light as regards color:

White Light.—(I.) Zirconium oxide, 40 per cent.; lanthanum oxide, 40 per cent.; thorinum oxide, 20 per cent. (II.) Zirconium oxide, 40 per cent.; lanthanum oxide, 60 per cent. (III.) Yttrium oxide, 20 per cent.; thorinum oxide, 80 per cent.

Yellow Light.—(I.) Lanthanum oxide, 40 per cent.; thorinum oxide, 28 per cent.; zirconium oxide, 30 per cent.; cerium oxide, 2 per cent. (II.) Zirconium oxide, 47 per cent.: lanthanum oxide, 50 per cent.; cerium oxide, 3 per cent.

Orange Light.—(I.) Lanthanum oxide, 40 per cent.; thorinum oxide, 30 per cent.; zirconium oxide, 27 per cent.; didynium oxide, 3 per cent. (II.) Lanthanum oxide, 50 per cent.; thorinum oxide, 40 per cent.; niobium oxide, 10 per cent.

Green Light.—Thorinum oxide, 50 per cent.; lanthanum oxide, 20 per cent.; erbium oxide, 30 per cent.

Many other oxides may be employed in the compositions, but the presence of some, such as alumina and magnesia, are very detrimental to the duration of the illuminating power.

Of the many substances which may be employed, cerium oxide is the most satisfactory for the yellow lights, when added in small quantities. Didynium oxide has the effect of causing a rapid diminution in the light, unless a high temperature can be maintained. I find the most effective, as to the duration of light, to be a composition of zirconium oxide, lanthanum oxide, thorinum oxide, and cerium oxide, to which a small quantity of yttrium oxide may also be added; mantles of this kind lasting from 800 to 1,000 hours.

The duration of the illuminating power varies considerably according to the nature of the fluid employed, a curious fact being that the diminution is very gradual as a rule after 500 hours' burning, and the light is then much whiter in color than when first used. Table I. shows the loss of the illuminating power of Welsbach mantles during 1,000 hours' burning. In each case 2.5 cubic feet of gas per hour, with 1 inch pressure, was used. In the first four instances the mantles contained lanthanum, zirconium, thorinum, and cerium oxides; in the last three, lanthanum, zirconium and cerium oxides.

Table I.

Original C. P.	100 Hours.	200.	300.	400.	500.	600.	700.	800.	900.	1,000.	Loss in Light.
23.2	22.0	21.4	20.8	17.4	17.0	17.0	16.0	16.0	16.0	16.0	31.0%
21.0	19.4	21.0	19.2	16.5	16.8	16.8	16.5	15.0	14.0	14.0	30.0 "
26.0	24.2	22.5	21.0	19.5	17.2	15.5	14.0	13.8	13.8	13.8	47.0 "
22.4	20.6	19.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	19.6 "
21.4	13.0	13.0	11.4	11.4	10.4	10.0	9.4	8.8	7.4	6.2	71.0 "
22 0	13.0	13.2	11.8	11.6	11.4	11.2	10.6	10.0	7.6	6.5	70.7 "
21.8	12.5	12.4	11.2	8.8	9.0	5.5	7.0	7.2	6.4	4.4	80.7 "

The illuminating power remains more constant when 1 per cent. cerium oxide is added to the fluid, but the color of the light is nearly red and unsuitable for ordinary purposes, the temperature of the Bunsen flame being insufficient to heat the cerium oxide to incandescence.

Mantles which give a light of a slightly yellow tint give a much higher illuminating power than those of a pure white light, and last much longer, as the following table will show:

Table II.

Gas, Cu. Ft.	Orig. Pressure.	Orig. C. P.	500 Hours.	1,000 Hours.	Color.
2.5	1.0 inch	17.6	5.4	4.3	White.
2.5	1.0 "	16.8	5.6	4.5	White.
2.5	1.0 "	25.6	18.0	13.7	Yellow.
2.5	1.0 "	27.2	17.6	13.0	Yellow.

The illuminating power of the different oxides varies considerably both in color and intensity, and differ in a large degree to their properties during the manufacture of the mantle. The oxides of thorinum, zirconium, yttrium, and aluminum when cold are rather brittle, but when brought to incandescence they become very flexible and easy to work. Lanthanum, cerium, didynium, and magnesium oxides, on the other hand, are very brittle, even when incandescent, and are more difficult to work; but a mixture of the oxides, provided the lanthanum does not exceed 50 per cent., is very flexible when brought to incandescence.

The illuminating power obtained from the pure oxides with 3 cubic feet of gas at one inch pressure and the color of the light are as follows: Lanthanum oxide, 22.5 candle power, white; zirconium oxide, 12.2 candle power, white; thorinum oxide, 25.0 candle power, bluish white; yttrium oxide, 19.8 candle power, yellowish white; cerium oxide, 4.0 candle power, nearly red.

The highest illuminating power I have been able to obtain from a mantle of the ordinary size is made from a mixture of 60 per cent.

thorinum oxide and 30 per cent. yttrium oxide, a mantle of this composition giving an illuminating power of 40 candles with 3 cubic feet of gas at 1 inch pressure.

To obtain a good illuminating power it is absolutely necessary to have the salts as free from impurities as possible, and special care has to be taken to get rid of the last trace of iron, which affects the illuminating power to a very large extent, the amount of iron usually present in the fluid being from 0.001 per cent. to 0.003 per cent.

Perfect combustion of the gas should also be carefully obtained, as, if too much gas is used, causing the flame to smoke, the illuminating power is considerably reduced, and a deposit of carbon takes place inside the mantle, which often increases to such an extent that the mantle is broken and thereby destroyed.

It is necessary that the flame of the Bunsen burner should be inside the mantle, as the presence of air or oxygen is necessary to obtain a good result, as the oxide only gives illuminating power in the oxidizing flame of the Bunsen. This is accomplished by means of the chimney the best form of which is contracted about 2 inches from the base, which forces the air onto the mantle and keeps the flame in the desired form.

The chimney usually employed is 9 inches in length, 2 inches in diameter at the base, and 1⅛ inches diameter at the top. The illuminating power differs according to the height of the chimney employed. With 3 cubic feet of gas at 1 inch pressure the relation between the height of the chimney and illuminating power is as follows:

Chimney, inches.....	12	9	8	7	6	5
Illuminating power, candles...	28.2	25.0	24.4	22.0	16.4	16.0

In the Clamond system of incandescent gas lighting a basket or hood of magnesia or zirconia is employed, which is heated to incandescence by an atmospheric burner of peculiar construction, whereby the air and gas are heated before combustion takes place. The hood is prepared by mixing pure magnesia with the solution of magnesium acetate, and forcing the mixture through a suitable disc, from which it issues in a continuous thread, and is wound into shape on a mandrel. The illuminating power obtained with this system is, when at its best, 5 candles per cubic foot, the chief drawback being the short life of the hood, which burns out in about 100 hours.

A number of systems have been shown whereby illuminating power is obtained from the metals platinum and iridium, among them being the Lewis and Sellon.

In the Lewis system a small hood of platinum or alloy of platinum and iridium is used, which is brought to incandescence by the Bunsen burner, perfected by Lewis, in which the air is admitted under pressure, this being a great drawback to its application for domestic purposes. The hood is brought to a high state of incandescence, and emits an illuminating power of 200 candles when consuming about 40 cubic feet of gas per hour, being equal to 5 candles per cubic foot. It is a curious fact that when the hood is incandescent the temperature is so great that it may be exposed to rain without being in any way affected. It is well suited for outside purposes or large buildings.

In the Sellon system a cone of metal gauze is employed, heated with a Bunsen burner of the same form as that employed with the Lewis. Another modification is that of a downward light, obtained by suspending a small piece of the refractory material (platinum gauze) between two diaphragms of asbestos; the gas and air are allowed to mix in a small glass bowl, afterward burning at the top of the gauze, which is immediately brought to a high state of incandesence, no flame being perceptible, showing that perfect combustion is obtained. In another modification the air and gas are carried in a small metal cylinder to the top of the outlet of the gases, and are heated in their passage downward before combustion takes place, the illuminating power being about 5 candles per cubic foot.

The attempts hitherto made with carbureted water gas have not been so successful as to meet with their general adoption. The system of Fahnehjelm, a Swedish chemist, is being extensively employed. This consists in attaching small pencils of magnesia or a mixture of magnesia and zirconia to a small frame in the form of a comb, which is suspended over the flame of a water gas burner and is immediately brought to a high state of incandescence. The pencils are prepared much in the same way as the Clamond hood or mantle. This system gives a very beautiful, intense, white light, and is not at all expensive, one drawback being the duration of the magnesia cone, which lasts only from about 50 to 100 hours; but this is considerably increased when magnesia and zirconia are employed. The magnesia cone costs only about 6 cents, is easily replaced, and the cost of lighting by this system is much less than that of ordinary gas, and the illuminating power considerably greater.

Before any system of incandescent gas lighting can be considered a success, so far as the adoption for ordinary use is concerned, there are many difficulties to be overcome, among them being as follows:

(1) Existing fittings should not be interfered with, except so far as the burner is concerned.

(2) The system ought to give a better and steadier light than the ordinary gas flame.

(3) No separate service pipes must be required, and the arrangement of the system must be as simple as that required for ordinary gas. There should be little or no liability of breakage or derangement.

(4) The duration of the lighting medium must be so great that the cost of renewals should be inappreciable.

(5) The consumption of gas must not be increased, but on the contrary a very marked saving in the consumption, or its equivalent in increased light, must be secured.

(6) The combustion of gas burnt must be more perfect than in the ordinary gas burner, in order to reduce the objectionable and destructive effects of gas consumed in dwellings.

(7) The atmosphere must be comparatively cool, and the light must not greatly deteriorate by the use of the illuminating medium.

As regards the above-named systems shown, notably Clamond, Welsbach and Sellon, the existing fittings are not interfered with, but at the same time a good pressure of gas (not under 1 inch pressure) is essential to obtain satisfactory results. The systems mentioned give a better and steadier light than the ordinary gas flame, being an inducement toward their employment. So far, none of the systems fulfill the conditions of ordinary gas as regards the simple arrangement required, all of them requiring more care and attention than the ordinary gas burner. A higher candle power per cubic foot is obtained, but at the same time, with all the systems, there is a gradual decrease in the illuminating power, and renewals of the illuminating medium are necessary to obtain the maximum amount of light. In incandescent gas lighting, the combustion of gas being perfect, the destructive effect on ceilings and paintings is much less than with the ordinary gas burners. That the illuminating medium will remain constant seems impossible so far, as with gas we have a continually renewed service for illumination, while the resistance offered by the illuminating medium employed in incandescent gas lighting to the ignited gas, and air drawn into the chimney, very soon causes an alteration in the lighting power, but which after a time remains fairly constant.

I have no doubt that considerable progress will be made with regard to the systems at present employed, and in the future incandescent gas lighting, provided the present difficulties are overcome, will be a serious competitor to electric light for ordinary domestic use or general illumination.

Copying Book Illustrations and Other Similar Subjects by Means of Artificial Light.

By Dr. T. N. Armstrong.

Although, undoubtedly, the most important part in the operation of photographing such subjects as china, silver plate, glass vessels, coins, etc., is the employment of a proper method of lighting the objects—for owing to the great dissimilarity in the shapes of such articles, hardly any two objects being alike, or fail to be treated in precisely the same manner—still of almost equal importance is the preparation or preliminary treatment of many such articles preparatory to their being copied; and here we have a very wide field for the operator to exercise his ingenuity in.

In the case of such articles as glass jugs, tumblers, or decanters, where the main object is not only to show off the beauty of shape, but likewise to depict in many instances the exquisite designs cut upon their surfaces, it stands to reason that were any one to proceed and merely photograph the same straight away, without having recourse to some method of preventing the designs on the further planes of the glass articles from interfering with that on the immediate side next the lens, nothing but a confusion of the various designs would ensue by the one overlapping or interfering with the other. Hence one of the first steps to be taken is to so arrange the vessel as to prevent this. And in cases where the shape of the article is such as to permit of its being filled with liquid, perhaps there is no better plan than that of filling it up with some semi-opaque liquid, which acts virtually as a backing or background to sides of the vessel. In the selection of such liquids a proper discrimination should be shown in the choice only of such liquids as are in keeping with the nature and shape of the various articles being photographed. It will require but little thought for an intelligent worker to understand that what would be quite suitable in the case of such an article as a cream jug would be quite out of place in the case of a wine decanter. Hence

the necessity of selecting only such liquids as are in keeping with the articles being copied. There are, however, numerous fluids to choose from. Skim milk, in some cases, comes in very handy, so also does claret, port and sherry wine in others, and an intelligent worker will, doubtless, be able to think of many more quite as suitable, such as beer and stout.

When following out this plan, it will be found that more natural results are secured when the vessels are not filled right up to the top.

So much for glass vessels. Now let me refer to the copying of silver cups and plate. In this class of work the main thing to overcome is the bright reflections of the burnished portions of the objects. Some writers advocate the use of ice when such is practicable, others recommend that the burnished parts receive an application of putty to deaden the surface and prevent the objectionable flare spots. I have used both these expedients with success, but latterly have discarded the use of them for a much simpler method. Simpler because it does not necessitate any tampering with the objects being copied, and, in cases where such are of a very delicate order, this becomes an important item, for with putty there is always a fear of damaging the surfaces.

The plan I adopt is merely to keep breathing on the object. This requires to be renewed after every few seconds during or at intervals in the exposure, but the cap of the lens can be easily put on and off to permit of the breathing being applied.

With some commercial firms, when any important object is being manufactured, and it is desired to have the same photographed, it is generally arranged for such being accomplished previously to the burnishing of the parts. This is a great advantage, but, of course, is not feasible in the great majority of cases.

When developing silver objects, the amount of pyro used should be very small, and the exposure given a very full one, and I have always got the best results on a dark background.

Medals and coins require some consideration in the selection of suitable backgrounds also, and the mode of their being held *in situ*. My best results with bronze medals and coins are got by using as a background a sheet of opal glass, and by placing the medals right on the surface with the aid of a very thick solution of powdered gum, almost to a jelly. Silver medals are best fixed up in the same way against a sheet of ordinary plain glass, while at some distance behind is placed a black velvet background. Gold medals and coins are best on opal, because they get more relief. China plates, and such like, are best relieved by black velvet placed at a distance.

So much for the necessary arrangements as to suitable backgrounds. When the best results are to be obtained attention must be given to this point.

In lighting there are numerous points to be considered, and here, at the outset, the first thing to be thought of is the shape of the object being photographed. When using artificial light I know of no better place for an amateur (or professional either, for that matter) to use than his long dining-room table placed under his gasalier. From such he may with convenience lead the gas to his Argand burners on their pedestals on the table by means of the rubber tubing, and when it is deemed expedient to throw in as much top light as possible, the gasalier, when fully lit, will render good help in this respect. Some objects are best lit by reflected light alone. In my practice I use my own invention, which is a plaster of Paris chamber, when copying some classes of subjects, but a very good and simple makeshift can be rigged up by anyone without any great cost. Say it is desired to copy a china plate so as to show off the design. Now here we have just a case in point that is best done by reflected light. This I would put into my chamber and so arrange matters that the lights are not in front of the object, but that the strong, bottled-up light brilliantly surrounded it.

A similar mode of lighting can be arranged for by merely cutting out a center in a large mounting board. This aperture should only be large enough to permit of the lens viewing the plate through. The china plate is then placed in position, and the two Argand lamps, one at each side, but not in front, so as to throw only reflected light from the white cardboard on it. In very many cases, when photographing by artificial light, it will be found that this intervening screen, placed so as to reflect light only on the object, will give much better results than by throwing the light directly from the gas lamps in front. One great advantage is that reflections are not nearly so liable to arise, and if the brass fittings of the camera and lens are covered up with a black cloth there should be no reflections at all to contend with.

THE new holder for the Norwalk (Conn.) Gas Light Company will be completed early the coming fall. It is to have a capacity of 75,000 cubic feet.

Utilization of Waste Carbonic Acid Gas.

The *Brewer's Journal* (London) asks: What would our ancestor of the brewhouse have said had he been told that the gas evolved during the progress of his fermentations was to be made a potent factor in bringing fresh meat from New Zealand to England, in charging torpedoes, in raising sunken ships, in condensing steel in the manufacture of heavy ordinance, in separating lime from the juice of the sugar-cane, and last, but not least, in preparing the beverages of the teetotal fanatics, with a view to cheapen production and improve quality. Poor John Barleycorn of past generations! Imagine the reception he would have accorded to the enterprising inventor who placed these possibilities before him. We are to-day confronted with a process, devised by serious men of acknowledged ability and exceptional experience, which has for its object the collection and utilization in the directions above indicated of waste carbonic acid gas, and the British public will shortly be invited to show its confidence in the possibilities of the process by becoming possessed of the patents by which the invention is protected. It should further be stated that, so far as the practicability of the process is concerned, it has been placed beyond the region of doubt for it has been tried, adopted, and is now working commercially in the brewery of Messrs. Guinness, Son & Co., Limited, and was deemed by the chairman to be of sufficient importance to warrant him in telling his shareholders "that he had good reason to hope that it would prove a not unimportant source of revenue." Our readers will scarcely need instructing that to deal with the gas in the form in which it is evolved in the tun would be non-commercial, if not impossible. Advantage has to be taken of the experiments of Faraday and Davy, which, supplementing those of Lavoiser in 1775, first demonstrated the possibility of compressing carbonic acid gas until it passed from the state of gas into that of liquid. It was further proved by Thilorier that the liquid thus prepared could be induced to assume a solid condition. All this will be familiar to the merest tyro in chemistry, and amongst the various finger-burning phases through which a student passes will certainly have to be included the paradoxical burn by solid carbonic acid when it is in a state resembling snow, and at a temperature far below the freezing point of water. It is in its liquid form that it is commercially useful, and its adaptability to enterprise has only been demonstrated within the last five years. The details connected with its compression upon a large scale have been worked out in Germany and Vienna, and notwithstanding that it requires a pressure of 36 atmospheres at a temperature not exceeding the freezing point of water for its liquefaction, and thus contains within itself a power of expansion likely to be very dangerous if not controlled, yet there seems no difficulty in this direction, and it is already handled with the facility of steam. It is at present largely employed in Germany for raising and aerating beer, as a substitute for the ordinary bar pump, and it has been imported in considerable bulk into England, where it has been applied in the arts for the various purposes already indicated. This importation has been followed by the erection of works in the neighborhood of London, devoted solely to the production and liquefaction of carbonic acid gas.

It next becomes necessary to inquire to what extent the carbonic acid of breweries is available, and whether or no its removal from the tun is likely injuriously to affect the fermentations. We think that if the process were to be adopted in all breweries of the country it would leave a total available raw material of 125,000 tons. This figure must, however, be subjected to reduction. The process is not, to our mind, applicable to all methods of brewing, and particularly to the union system in vogue at Burton, at least it is difficult to see how it could be made available in Burton Breweries without costly plant and much trouble to the brewer. Further, we do not consider that it would be worth the while of any brewer with less than say a five-and-twenty quarter plant to commence the recovery of his gas. On the other hand, it seems pre-eminently suited to the requirements of the stone square system, and should also be capable of use in London, Scotland and such centers as Birmingham and Manchester. Weighing all these considerations, it would appear that the new company may fairly hope to deal with 25,000 tons of gas per annum, when once the process is introduced and its advantages are demonstrated. This, of course, is a considerable figure, and one which would not only allow a very handsome profit to the company, but would constitute a very large and very welcome unearned increment to the brewer.

Having dealt with those questions which cover the scope of the process and its possibilities, and having shown that from these points of view it is practicable and commercial, we proceed to discuss a problem still more vital to the brewer: Will the process injuriously affect his fermentations? It is superfluous to add that, should this be the case, the

waste product would almost require to be converted into ingots of gold to possess any attraction for the brewer. A *prima facie* case that no harm is done is certainly discernable in the adoption of the process by Messrs. Guinness. If it were necessary to accumulate a pond of carbonic acid gas upon the head of yeast in the tun, in order to form a reservoir from which to draw the gas for liquefaction, we should not hesitate to condemn the process off-hand. This does not seem to be the case; indeed, it would appear that the heads can be kept freer from the gas than hitherto, and the time of removal, together with the quantity extracted, can be regulated at will. In the specification describing the process, directions are given that the fermenting tuns shall be closed against air, and unless some particular method were devised for aerating, this would place the brewer at a great disadvantage; but we are informed that this difficulty has been overcome, and that closed tuns are no longer a necessity. The method of removing the gas, of cleansing it from vinous ethers and intermingled yeast cells, is both simple and effective, and the subsequent liquefaction of the gas is too well known to demand description. The condensed gas is passed direct into bottles ready for transit, or can be so arranged that advantage is taken of its great refrigerating power to cool liquor for brewery use before being finally passed in weighed quantity into the bottles. The final product is extremely pure, and almost entirely free from atmospheric air. It is stated on the authority of Sir Charles Cameron that the gas can be prepared ready for sale at a cost not exceeding one-half penny per pound; and since the mineral made gas certainly cannot be produced at less than 4d. per lb., exclusive of the cost of the generator; and further, since the cost of installing the new plant cannot be large, it seems reasonable to anticipate a wide and successful field of operations for the new company, the career of which will certainly be watched with interest by all connected with the brewing trade.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

We understand that Prof. T. S. C. Lowe will put up a factory at Passadena, Cal., for the manufacture of gas fixtures. The work is to be carried out on a large scale.

The following is a copy of the act (passed on the 14th inst., at Dover, Delaware) defining the conditions under which the streets of cities and towns of Delaware may be disturbed for the purpose of placing pipes, wires or other conductors:

"*Be it enacted* by the Senate and House of Representatives," etc.: "*Section I.*—No person or corporation shall open or excavate the bed of any street or highway of any city, town or village in this State for the purpose of laying or placing pipes, wires, or other conductors therein, without first obtaining the consent of the duly constituted authorities of such city, town, or village.

"Provided, however, that nothing herein contained shall require such consent before opening or excavating the bed of any such street or highway for the purpose of repairing any pipes, wires, or other conductors theretofore lawfully laid or placed in such street or highway."

Messrs. Eugene Bremond and A. E. Judge, of Austin, Texas and Mr. Sylvester Watts, of St. Louis, Mo., who owned the property and franchises of the Austin Gas, Water and Power Company, have sold the same to a Philadelphia syndicate, well known from its connection with enterprises of a similar nature.

Mr. Robert N. Prestidge has been elected Secretary of the Detroit (Mich.) Mutual Gas Company, vice Mr. William B. Miller. The change was made on the 1st inst.

Mr. T. S. Wilkinson has been appointed Superintendent of the Kenosha (Wis.) Gas, Electric Light and Fuel Company, vice Mr. F. W. Bate, resigned.

The proprietors of the Cleveland (Ohio) Gas Companies have, through their attorneys, made application for a permanent injunction restraining the authorities from enforcing the provisions of the ordinance recently passed which declares that hereafter gas must be sold in Cleveland at a rate not in excess of 60 cents per 1,000 cubic feet.

At the annual meeting of the Glens Falls (N. Y.) Gas Light Company the following officers were elected: President, D. H. Cowles; Vice-President, F. A. Sabbaton; Secretary and Treasurer, F. F. Pruyn; Superintendent, H. A. Brooke; Directors, D. H. Cowles, F. F. Pruyn and H. A. Brooke, of Glens Falls, F. A. Sabbaton, of Troy, and P. S. Merrifield, R. Merrifield and P. A. Sabbaton, of New York.

A resolution (introduced by Mr. Turpin) has passed the Richmond (Va.) Board of Aldermen, which puts the gas rate in that city at $1.25 per 1,000 cubic feet, the concession to take effect on and after February 1, 1892, which is the beginning of the next fiscal year for Richmond. Mr. Turpin, who has been an earnest champion of the movement for a reduction, is to be congratulated on the outcome of his perseverance. The current rate is $1.50 per 1,000. Perhaps Director Windrim, of the Philadelphia municipal works, will soon be authorized to make a similar announcement in respect to the gas rate for the Quaker City.

The works and franchise of the Newberne (N. C.) Gas Light Company have been sold to Mr. S. W. Smallwood. The purchase price is returned at $10,500.

Mr. G. Blumcke, M.E., of Hamburg, Germany, who represents the Westinghouse Machine Company in Germany and Austria, has devised and put into very successful operation, on a number of freight vessels entering the seaports of North Germany, an invention for rapidly and cheaply unloading coal, iron ore and low grade freights. The ordinary colliers that enter the port of Hamburg require 72 men, working 24 hours, to unload them, but by Mr. Blumcke's plan 30 men working 12 hours accomplish the end desired. Each collier has four hatches, and between each pair of hatches a small Westinghouse engine is placed temporarily on deck, which is supplied with steam through a hose from a portable boiler located on the adjoining dock. Shafts temporarily bolted at one side of each hatch are driven by belts from the engine. Each shaft carries three grooved friction spools. The workmen by simply bearing down on a treadle cause the friction wheels to engage the spool, which in turn lift the basketful of coal from the hold of a vessel at a speed of 12 feet per second. The whole apparatus, consisting of two small Westinghouse engines and the four shafts, is easily put in place on deck in 30 minutes' time. Steam is furnished from portable boilers on the docks at Hamburg as an article of merchandise, and is therefore readily available for sailing vessels such as those colliers are. Mr. Blumcke, in the first plant put in operation, used 10-horse power engines, which, generally speaking, furnished ample power. When, however, as sometimes happened, all six treadles on each engine would be pressed at the same time (this demanding of the engine that it lift six baskets at once), the power was insufficient and the engine would stop unless relieved of some of its load. For this reason, Mr. Blumcke has since employed 25-horse power engines for the purpose, which are found to have abundant power to lift all the baskets at the standard speed at once.

The sentiment at Lynn, Mass., is against the bill in the Massachusetts Legislature which seeks to confer on cities and towns the right to engage in the manufacture and distribution of gas and electricity. A correspondent at that point forwards the following in respect to the matter: "If the sentiments of members of the Lynn city government may be deemed as indicative, the principle of municipal illumination will fail of acceptance in the Shoe City. There appears to be an opposition to the measure that assures in advance its defeat if action is ever taken upon it by the municipal government. The idea prevails that the bill is too paternalistic in doctrine, and that its adoption would establish a bad precedent. General opinion is that there is no valid reason why the measure should be commended, and that it is not susceptible of analysis. Mayor Fogg, when appealed to for his views on the question, said: 'As I view the matter at present, I would consider it unwise to accept the provisions of the bill. The principle is of that character that it may be extended, and it is questionable if they would be justified in interfering with business conducted by private concerns.' Alderman Henry A. Marks, who was very emphatic in his condemnation of the proposition, said: 'I have given the subject careful consideration, and am convinced that the measure should be rejected. The city cannot in justice interfere with private enterprise, for when that is interfered with progress is retarded. Since the question was raised concerning the constitutionality of municipalities maintaining lighting stations I have endeavored to analyze the question, and have concluded that private enterprise should not be restricted. I will never vote for the acceptance of the bill.' Alderman S. R. Brown believed 'it would be advisable to maintain a municipal lighting station; but I would confine the use of the station to lighting the public streets and buildings.' Alderman George C. Blakely would not, if he were to vote on the question, support the measure, and concurs in the remarks of Mayor Fogg and Alderman Marks that it is inadvisable for the municipality to do aught calculated to infringe upon the rights of private individuals or concerns. 'Why,' said he, 'this idea might be extended, and it is not difficult to conceive of the city selling coal or manufacturing shoes. One might be as justi-

fiable as the other.' Business men were almost unanimously opposed to the measure, and were outspoken in the opinion that such legislation was pernicious and uncalled for."

A SIMILAR feeling in opposition to the bill is reported from Cambridge, Chelsea, Lawrence, Haverhill, Lowell, Gloucester, Boston proper, Pittsfield, Taunton, Fall River and Worcester, whereas the bill is favorably looked upon in Fitchburg, Newburyport and Newton.

THE shareholders in the Cincinnati Gas Company, having consented to an increase in the capital stock for the purpose of defraying the expense of increasing the manufacturing and distributing capacity of the Company and paying for additional mains, the Directors have ordered the issuance of said stock and its distribution to stockholders in ratio to their respective interests of record May 11th, deliverable on paying par for same on the first day of June, or within ten days thereafter, interest to be added on payments delayed beyond June 2d. The transfer books were closed on the 11th and reopened on the 20th. As to the distribution of the new stock, the official circular says: "For each share of stock standing in your name on said 11th day of May you will be entitled to receive, at par, $7.69 of the new stock (being in the ratio of one share for each 13 shares held on that date), which will be issued in even sums of $100 or multiples thereof, thereafter to carry all the rights and privileges of the present stock of the Company. For fractional shares no scrip certificates will be issued, but in lieu thereof cash payments will be made therefor on the first and second days of June at the assumed market rate of $200 per share. The fractional shares thus acquired afterward to be converted into full shares, sold in the open market, and the proceeds reconveyed into the treasury of the Company for the equal benefit of all the stockholders."

SUPERINTENDENT CAPRON, of the Attleboro (Mass.) Gas Company, reports that, after a fair trial, both as to duration and practice, the Ramsdell wood gas system has been abandoned.

AT the annual meeting of the stockholders in the Conshohocken (Pa.) Gas and Water Company the following officers were chosen: President, Jawood Lukens; Treasurer, Alfred Craft; Board of Managers, Alan Wood, Jr., William Summers, Howard Wood, Lewis A. Lukens, James Tracy.

MR. C. W. JOHNSON has been elected Treasurer of the Southbridge, (Mass.) Gas and Electric Company in place of Mr. C. D. Paige. J. R. McLean, hitherto in charge of the electric department, assumes full charge of the gas and electric plants as Superintendent.

THE gas works at Ocean City, N. J., the estimated cost of which is put at $18,000, will be owned by Atlantic City capitalists.

AT the annual meeting of the Keyport and Matawan (N. J.) Gas Light Company Mr. T. S. R. Brown was elected President and Mr. J. H. Hornor was chosen Secretary. A dividend of 3 per cent. (payable July 1st) was declared.

THE St. Joseph (Mo.) water gas plant is said to be in working order. Mr. W. P. Lane is the manager of the works.

THE proprietors of the Jamaica Plain (Mass.) Company have awarded contracts for 6 new benches of 6's and 5 miles of main pipe. The improvements were made necessary through the Company's determination to pipe the adjoining districts of Roslindale and West Roxbury. The Waldo Brothers are to furnish the fireclay materials, Messrs. Davis and Farnum the iron work, and Chauncy K. Bullock will attend to the mason work.

AT the annual meeting of the Citizens Gas Light and Heat Company, of Bloomington, Ills., the following officers were elected: Directors, P. P. Mast and Ross Mitchell, of Springfield, O., and George B. Funk, Henry Capen, and J. L. White, of Bloomington. President, P. P. Mast; Vice-President, George P. Funk; Secretary and Treasurer, J. A. Wilcox.

THE City Point Land Improvement and Development Company has been chartered by the Circuit Court, of Petersburg, Va. One object of the concern is "to erect, maintain and manage electric and gas works." It is capitalized in $100,000, with power to increase to $800,000. The officers for the first year are: C. D. Tinsley, of Petersburg, President; M. S. Klepping (Philadelphia), Secretary; Henry Harrison (Philadelphia), Treasurer. The officers and C. A. Pfau and R. J. Harrison (Philadelphia) are the Directors.

AT the annual meeting of the Newton (N. J.) Gas Light Company the following Directors were chosen: A. F. Fellows, F. J. Swayze, O. D. Reeves, Wallace Myers, Rutherford Tuttle and John W. Lane.

THE Paterson (N. J.) Company has made all the necessary arrangements for extending its gas mains to the hamlet of Totowa.

THE following is from a correspondent at South Framingham, Mass.: "The new gas system has now been in operation at South Framingham for several weeks, and is giving good satisfaction wherever used. The beautiful light is admired, the heater stoves are found to be convenient and not expensive, and there promises to be a good demand for gas cooking ranges, those now in use here giving good satisfaction. Within the few weeks since the system was put in operation the gas has come to be used for tailors' irons, soldering furnaces, photographers' burnishing machines, druggists' cigar lighters, restaurant hot griddle plates, tea and coffee boilers, besides the usual lighting, heating and cooking. When Mr. H. S. Jackson came here to apply for a franchise for this system and in the inevitable delay of getting a start, there were those of course who doubted the fulfillment of promises made, but it is to Mr. Jackson's credit that he not only made good every promise to the town, but he built one of the finest plants of its size in the country, and has performed much more than he agreed to. The town may thank him for addding to its facilities for business and home comforts."

The following correspondence explains itself:

WORCESTER GAS LIGHT COMPANY,
WORCESTER, MASS., May 19, 1891.

To the Editor AMERICAN GAS LIGHT JOURNAL:

You probably have by this time heard of the sad accident at our works on Saturday last, and in order that you may have an authentic account of the occurrence, I send you the following, which is my understanding of the matter after careful inquiry. We had decided to put a Jones jet photometer on the outlet pipe of our water gas holder, in a valve house that stands some distance from said holder. It was at first proposed to use an old connection, but I now find that as that was rusted, they decided to drill a new ¾-inch hole. The foreman at the works, Michael McNamara, who had been with us 18 years, directed a laborer, named Hamilton, to drill this hole, but, strangely enough, left no one near the workman to assist him, or to watch over him. Coming back after a while to look after the progress of the work, he must have discovered that Hamilton had been overcome by the gas. The foreman cried out for help and jumped into the cellar to take Hamilton out. A man named Ryan, who was working near by, ran to the valve house, and Ryan subsequently told us that McNamara was in the hole trying to pull Hamilton out. Ryan joined in McNamara's effort, and all were overcome. A clerk in the office soon saw Ryan and called to the Superintendent, Mr. Wetherbee. The clerk and the latter ran to the spot and pulled Ryan out, who was quite unconscious. Mr. Wetherbee tried to find the foreman, but having sent all over the works and failing to find him, it flashed upon him that the missing man was in the valve house cellar. Looking in he saw the two men. Seizing some soap he jumped in himself and stopped the leak. Mr. Wetherbee and the clerk were both a good deal affected, and, for a time, overcome. Ryan was sent to the hospital and recovered, and is again at work. Superintendent Wetherbee and the clerk (Mr. Converse) are also at work. McNamara and Hamilton died. It seems strange that such serious results should have followed. It is hard to understand now how the foreman (McNamara) should have neglected to guard more carefully against the danger, more especially as he was a good, intelligent man, and thoroughly conversant with his business. We can only suppose that the question of drilling a ¾ inch hole seemed so simple a matter to him that it did not occur to him to take more precaution. He fully understood the danger of water gas—he had had to do with the manufacture of it since the start in 1876. The occurrence has been a great shock to us, and for the past few days has cast a gloom over our works.

Truly yours, CHAS. D. LAMSON.

THE Associated Press man at St. Louis, fired no doubt with religious zeal because the Sabbath day was upon him, got out his trusty pencil, on the afternoon of May 17th and hieing him off to the nearest telegraph station at once telegraphed a glowing tale to Press headquarters for transmission throughout the country. Those who read the "thrilling lines" next morning (Monday, May 18th) in their favorite newspaper—and more particularly if they were interested in the stocks or bonds of the Laclede Gas Company, of St. Louis—must have had small regard for their toast, etc., since it appeared that the works of the Company, and all its employees, had been swept off the face of the earth, through

an explosion. Pompeii had a prototype, and that which incandescent electric lighting promoters in St. Louis had failed for years to accomplish was consumated in a twinkling by the latent power let loose by the detonation of the Laclede's own gas. Mangled bodies, fallen walls and smoking piles were all that the Laclede could count on—save shares of stock that might now be thrown to the winds. The real situation was bad enough, for one life had been blotted out and several benches of the Company were fantastically buried in the flotsam of what had been a portion of the roof of the retort house at station "A," but had it not been for that one life, and bruises more or less on the bodies of three other workmen, one could well afford to laugh at the St. Louis Press man's jangling shrieks. The facts in the case are these: At 1 P. M., of Sunday, May 17th without any apparent cause—the roof had been carefully examined 30 days ago—the roof on the house at station "A," extending north to Convent street, fell with a sharp and grinding report, right on and about the benches, a portion of which were under fire. In less than half an hour Engineer Egner and Superintendent Chollar were on hand and at work, like the clear-headed men they are. The rabble that swarmed about the place were driven away, all available hands from the other stations were summoned, the reserve benches in the other or safe part of the Convent street house were put under fire, as also a number of the reserve benches at station "B," as a matter of precaution merely. Gates and valves were looked after, too. Finally, before the dust created was half settled, shovel gangs were working with a will, and as mouthpiece after mouthpiece was uncovered, no fractures were found. Stand, dip and bridge-pipes—some battered, of course—hydraulic main and connections, and so on, were fit for duty, and six hours after the roof tumbled the benches in the "ruin" were, while "far from strong," still able to take their coal charges and go on with their work, "thank, you!" The Chief of the Fire Department, after a critical examination of the remaining section of the house roof—the house is divided in two by a bulkhead wall, and it was the north end section that caved—gave it as his opinion that it was sound, an opinion indorsed by both Messrs. Egner and Chollar. It was also determined that the walls which carried the ruined roof were not in the least strained, in proof whereof we have only to submit that a temporary wooden roof is now being tied to them. Of course, an iron roof will be placed before the cold weather sets in. The only real damage to the retort house machinery, in so far as that relates to the benches, was a broken oil pipe, also a steam pipe. While there was loss of life—James Hurley was instantly killed—and injury to person—Thomas Collins, severely, and James O'Rourke and James Wright, lightly—there is reason for congratulation that the debit side on this account is not more appalling. The cave happened at the very slackest moment in the charging and drawing schedule, and on the day of the week when the fewest hands were at work. We are unable at this writing to state the cause of the break, but hope at some future time to place an accurate account of the same before our readers. As Superintendent Thompson is quite an expert with the "Kodak," it is more than likely that several views of the ruin will soon be available.

A MOVEMENT is on foot at Davenport, Ia., which has for its object the abolition of the local Gas Company's practice of charging a monthly rental for its meters. There can be no doubt that this rule is decidedly objectionable to gas users, and it should not prevail in any instance where the consumer's average use of gas is 2,000 feet per month. It is also unreasonable to hold that a measuring instrument should be maintained free of charge to a consumer whose use of gas does not return to the Company a sum sufficient to pay for the interest on the meter and the cost of wear and tear.

MR. JOHN R. NOWLAND, who has been continuously in the service of the Philadelphia, Wilmington and Baltimore Railroad Company for the last 27 years, has resigned his berth so that he may assume the Superintendency of the South Chester (Pa.) gas works.

OYSTER BAY, L. I., is to be called upon soon to support an electric light company. The promoters estimate that $10,000 will equip a lighting station of the capacity required.

AT the annual meeting of the Montclair (N. J.) Gas and Water Company, the following officers were chosen: President, Dr. J. H. H. Love; Vice-President, Mathias Dodd; Secretary and Treasurer, William Baldwin; Directors, Dr. J. H. H. Love, Mathias Dodd, S. W. Corey, A. B. Howe, T. W. Langstroth and Eugene Vanderpool.

A QUEER accident is reported from New Orleans. A heavily loaded wagon drawn by five mules was being driven through Howard street, when, contrary to their usual slow-going style of locomotion, the animals dashed off at breakneck speed. At the corner of Howard and Clio streets the long-eared thoroughbreds collided with an electric light tower. Whether it was that the mules were strong or that the tower was weak, the fact is that the tower came down with a crash. The mules were unharmed; more's the pity.

ACCORDING to our present advices the ever-busy firm, known as the Davis & Farnum Manufacturing Company, are right in the swim this year. Indulging in a trip to Europe this summer is not likely to be the portion of anyone connected with the Company, but perhaps they are as well satisfied. A look over their order books not only shows that they are busy but also conveys the knowledge that the gas men of the East are selling more gas than ever, and that is sure to please all of us. Some of the Company's contracts are here briefly outlined: An 80-foot double lift holder for the New Britain (Conn.) Gas Company; a 50-foot double lift holder for the Saco and Biddeford (Me.) Company; a 70-foot single lift holder for the Norwalk (Conn.) Company; a 57-foot single lift for the Nashua (N. H.) Company and a 40 foot single lift for the Catskill (N. Y.) Company. Saco and Biddeford will also take one set of four purifiers, 9 ft. by 13 ft., two benches of 5's, a 54-inch station meter, and a 12-inch Connelly street governor, with connections, etc. The Concord Company will take one set of 14 ft. by 18 ft. purifiers—12 inch valve connections—and a 78 inch station meter. The Nashua Company will, in addition to the holder, require a Wilbraham exhauster, with Huntoon governor and engine. The Peoples Company (Brooklyn, N. Y.) order a large exhauster and the necessary connections. The Massachusetts Gas Companies also make a strong showing on the Davis & Farnum books. For instance the following orders are from the named points in that State: Newburyport, a 42 ft. holder, single lift; Brockton, one sinuous friction condenser; Jamaica Plain, six benches of 6's, complete, iron roof, doors and shutters for house, and a 10 inch Connelly street governor and connections; East Boston, four benches of 6's, complete; Lynn, one set of purifiers, 20 ft. by 24 ft., with seal and 16-inch connections; Fitchburg, castings, complete, for two benches of 6's. These are only the "big" orders, but the "little ones," which come thick and fast, for "goods in stock," are "far too numerous to mention." So may it be.

THE new buildings for the Baltimore Electric Refining Company, at Baltimore, Md., are to be of iron from designs furnished by the Berlin Iron Bridge Company, of East Berlin, Conn. The same contractors will also supply the material and put it in position. The rolling mill is to be 56 feet in width by 180 feet in length; the refinery building will be 130 feet in width by 80 feet in length, and the boiler-house is to be 49 feet in width by 50 feet in length. All the structures are to be of iron, no wood to be employed in their make-up in any shape.

THE Fahnehjelm Incandescent Light Company evidently has reason for presuming that Mr. Henry C. Rew's letters come to him through the Chicago post office.

PROF. NOYES did not prepare the analyses of the gas supplied by the Citizens Fuel Gas Company of Terre Haute, Ind., the figures of which were given in the JOURNAL for the 18th inst., although they were imputed to him. The figures were garbled—the amateurs would say "mutilated"—but the following tables can be taken as the exact results of analyses made by the Professor in the second week of this month:

	Terre Haute Gas Co.	Citizens Fuel Gas Co.
Carbon dioxide	1.0	2.2
Illuminants	14.2	16.2
Oxygen	0.9	1.1
Carbon monoxide	21.5	7.9
Marsh Gas	23.9	19.2
Hydrogen	33.7	14.5
Nitrogen	4.8	38.9
English heat units per c. f.	732	565

Kleeman's Gas and Smoke Helmet.

The *Scientific American* says that an apparatus likely to be useful in gas works in cases of emergency when valves have to be closed or repairs effected in an atmosphere charged with either coal or carbonic acid gas, or thick smoke, is Kleeman's respirator. The appliance consists of a leather helmet, a bellows, and a hose for connecting the helmet with the bellows. The helmet fits tightly over the head, having a visor with glazed sights very much like an ordinary diver's helmet, only of course much lighter and differently fitted. The fresh air enters the mouth-piece, by means of a suitable connection with the hose; flows round the face and head of the wearer, and finally escapes through a valve on the top of the helmet. The necessary adjustments are very simple; so that any one can learn how to use the appliance after a short trial. The weight of the helmet is only 2½ lbs., and it is stated that it does not interfere in any way with the movements of the wearer. Since the head is wholly protected by the helmet, the eyes are not incommoded by smoke or acid gases. The bellows are, of course, to be worked in pure air at a distance by an assistant; but the whole arrangement is naturally lighter and handier than diving apparatus.

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
PROPRIETORS.

EDITOR—Jos. R. Thomas, C.E.
ASST. EDITOR—T. J. Cunningham.
MANAGER—C. E. Sanderson.

PUBLISHED ON EACH MONDAY OF THE YEAR AT
No. 32 Pine Street, New York.

This is a recognized official organ of
LIGHT, HEAT, STEAM, WATER SUPPLY,
VENTILATION, SANITARY IMPROVEMENT,
AND GENERAL SCIENCE

TERMS:

SUBSCRIPTION—Three Dollars per annum, in advance. Single copies, 10 cents.

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NEW YORK.—AMERICAN NEWS CO., 39 and 41 Chambers Street
Germany.—B. WESTERMANN & CO., of New York.

MONDAY, MAY 25, 1891.

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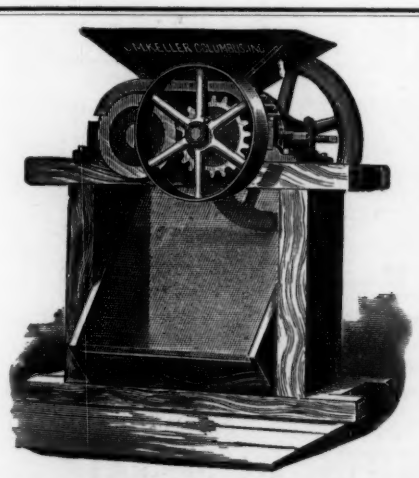

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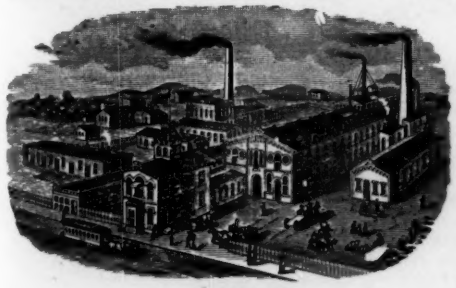

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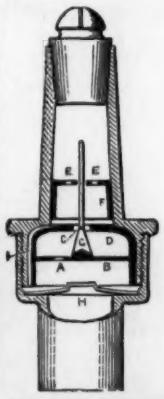

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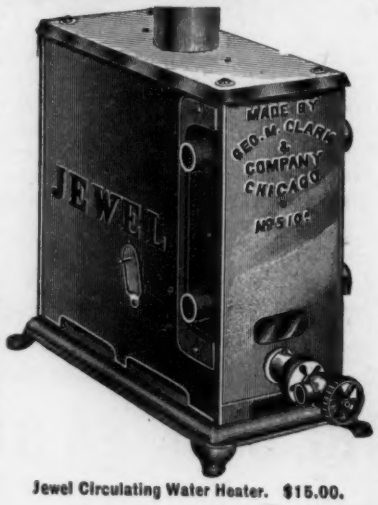

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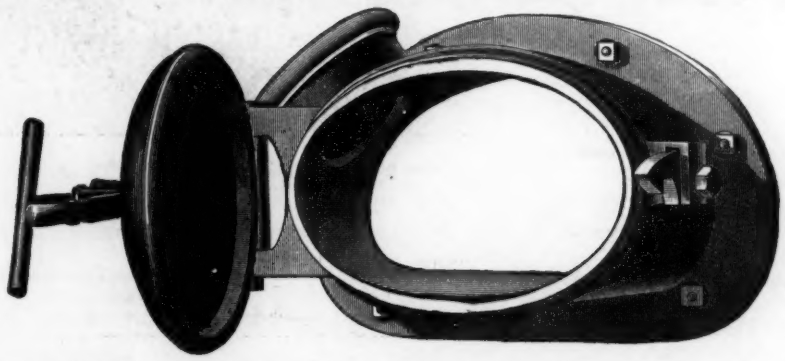

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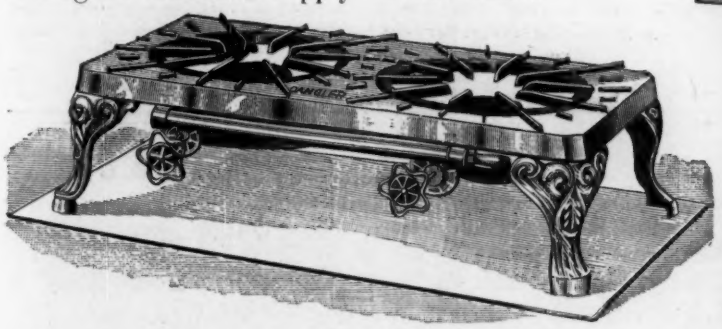
HOT WATER DEVICE

is a marvel of convenience and economy, furnishing an unfailing supply of hot water.



Our line includes all the different styles of Ranges and Stoves, and we call special attention to our

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which are especially popular on account of the size and style, and finished either in nickel or polished iron.

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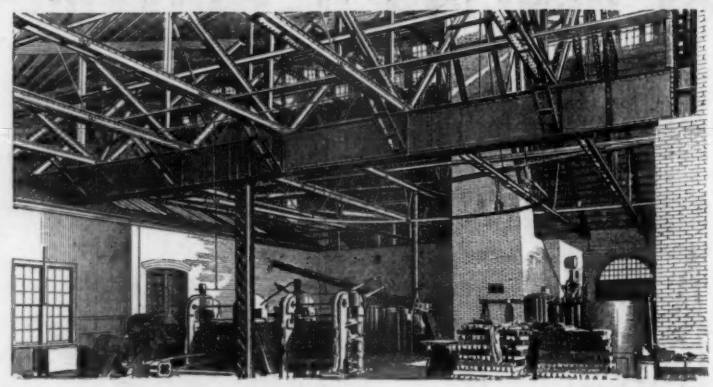

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A very general demand exists, in both large and small Gas Works, for an apparatus that will be absolutely efficient in the removal of the Tar which passes the hydraulic main and condenser. Many attempts have been made to accomplish this, but, I believe, without success, until the introduction, six years ago, in England, of the C. & W. Walker Patent Tar and Carbonic Acid Extractor. During these years this apparatus has been adopted by many of the most prominent Engineers, not only in England, but also on the Continent of Europe and in other parts of the world. Several have been erected in the United States.

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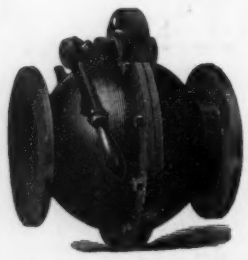

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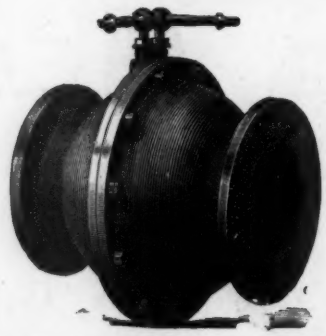

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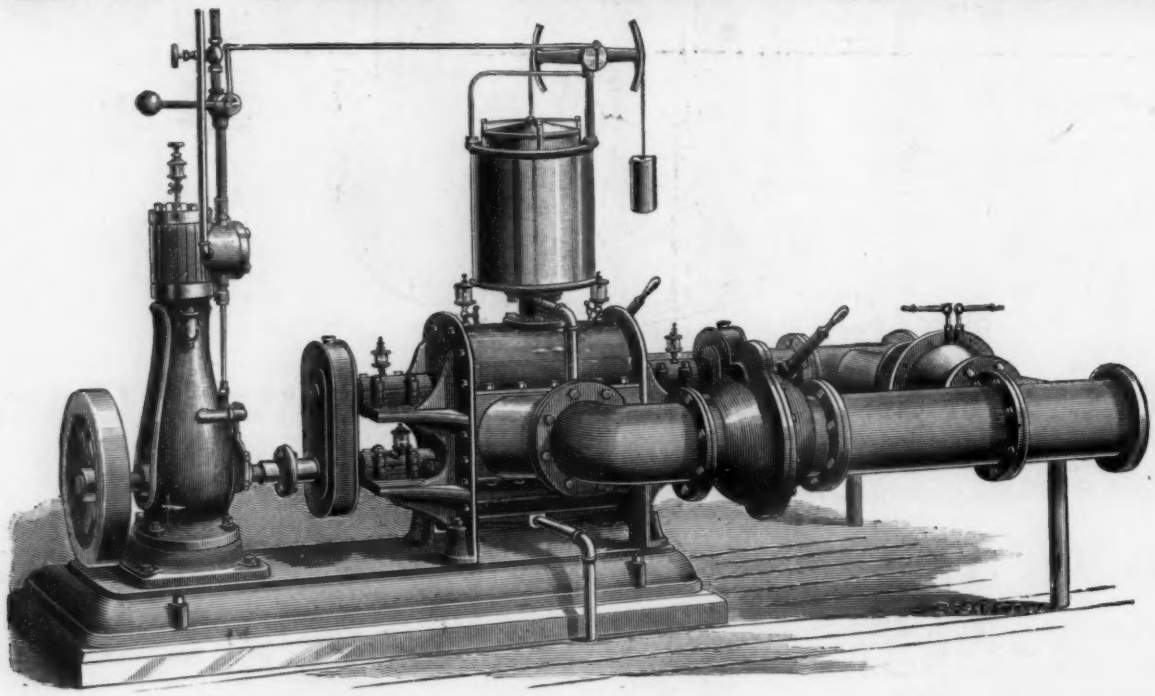

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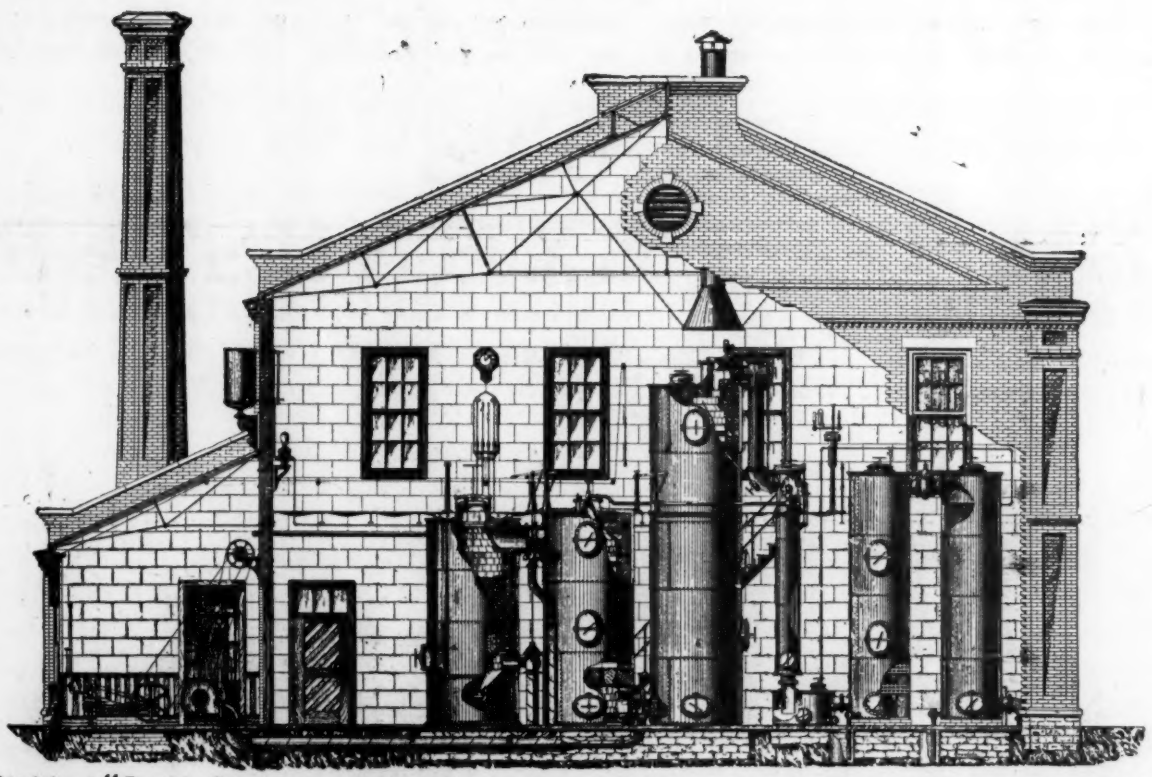

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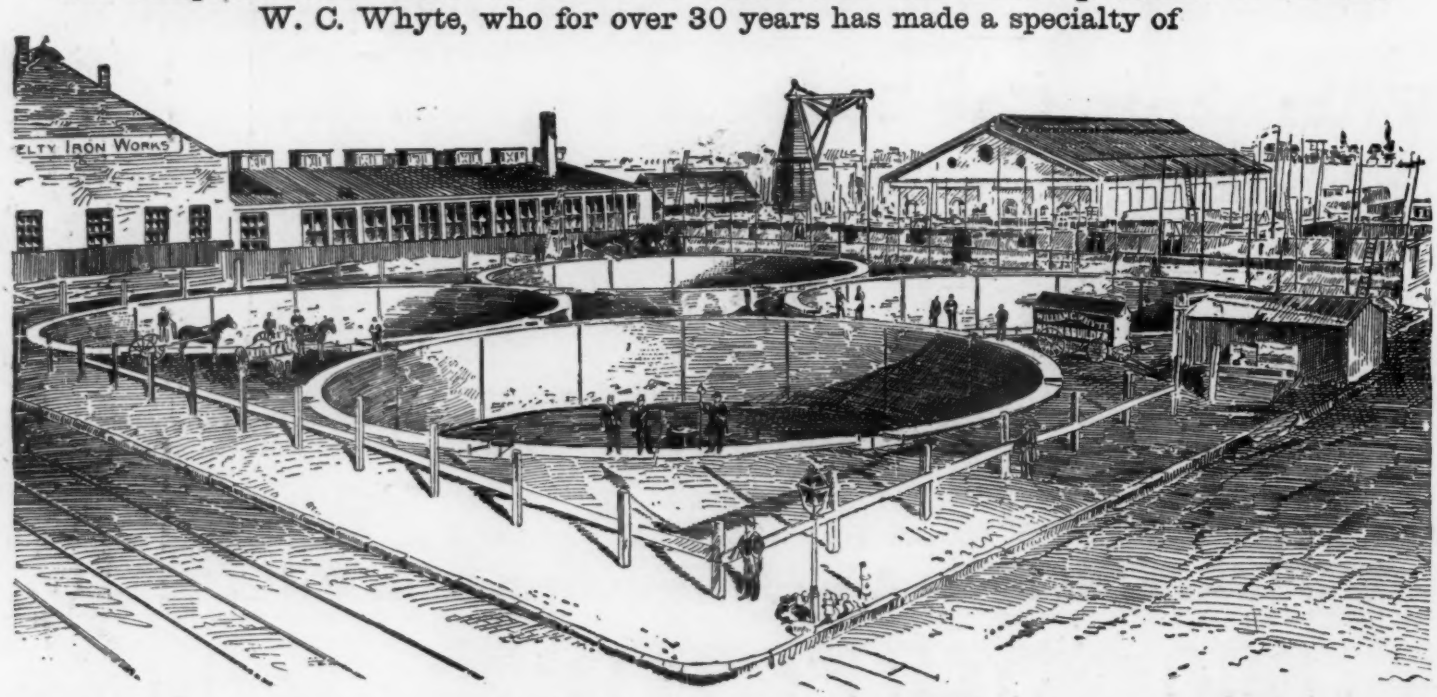

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Price, ... $5.00.

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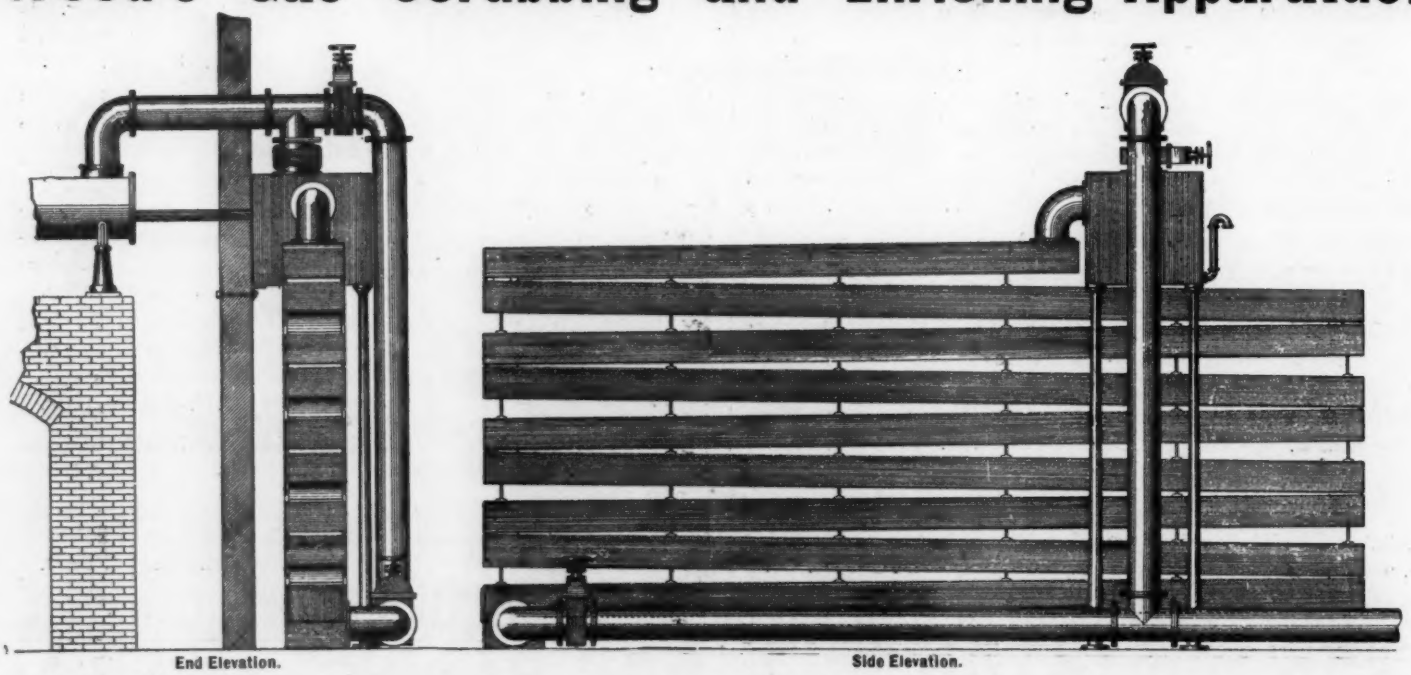

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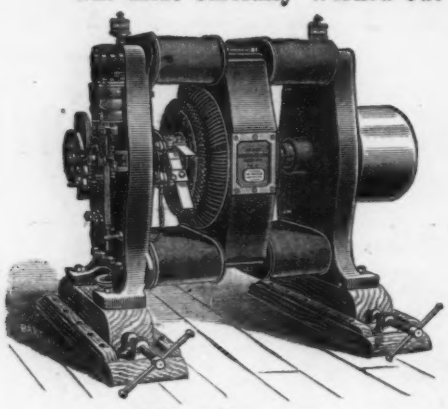

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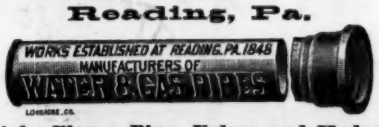

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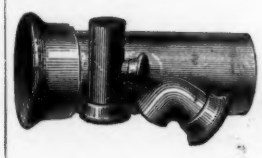

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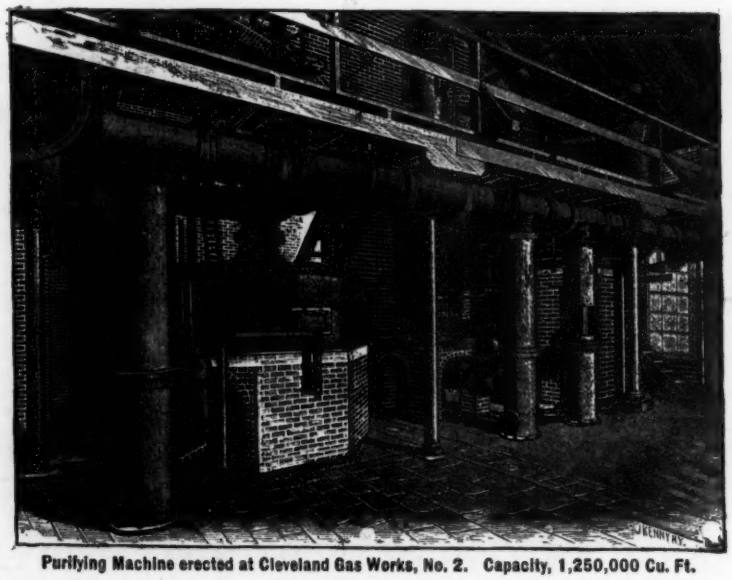

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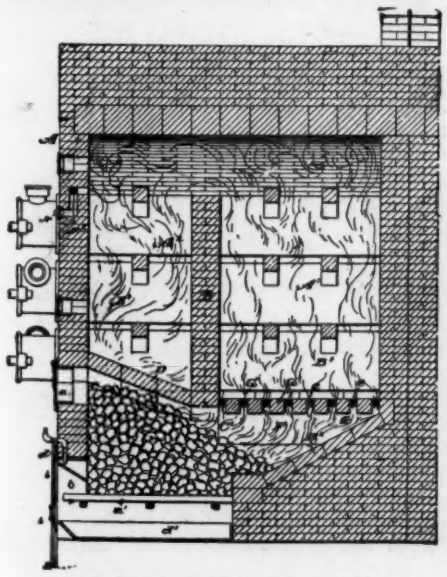

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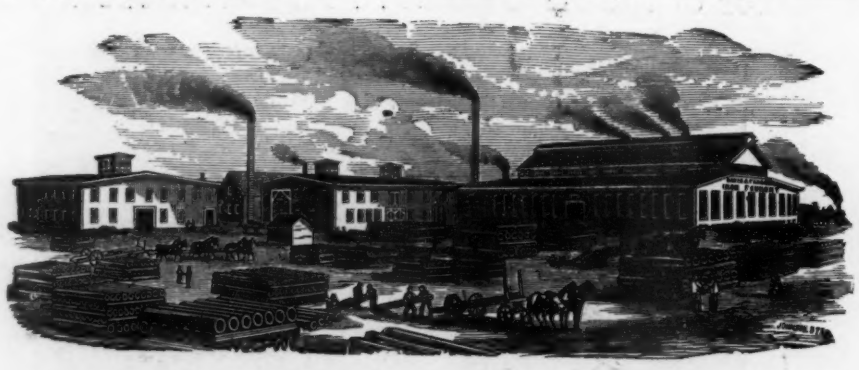

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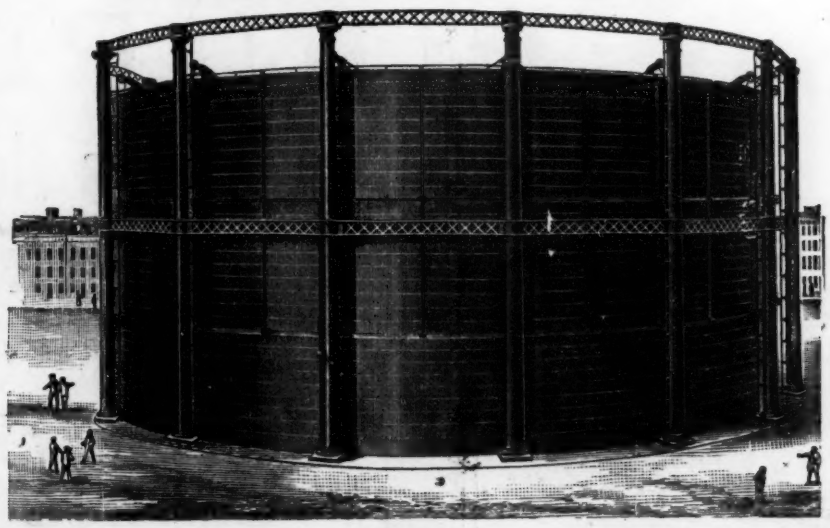

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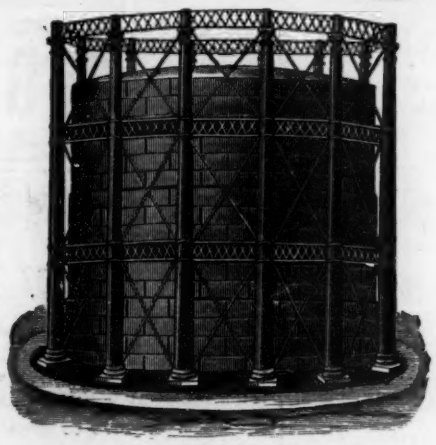

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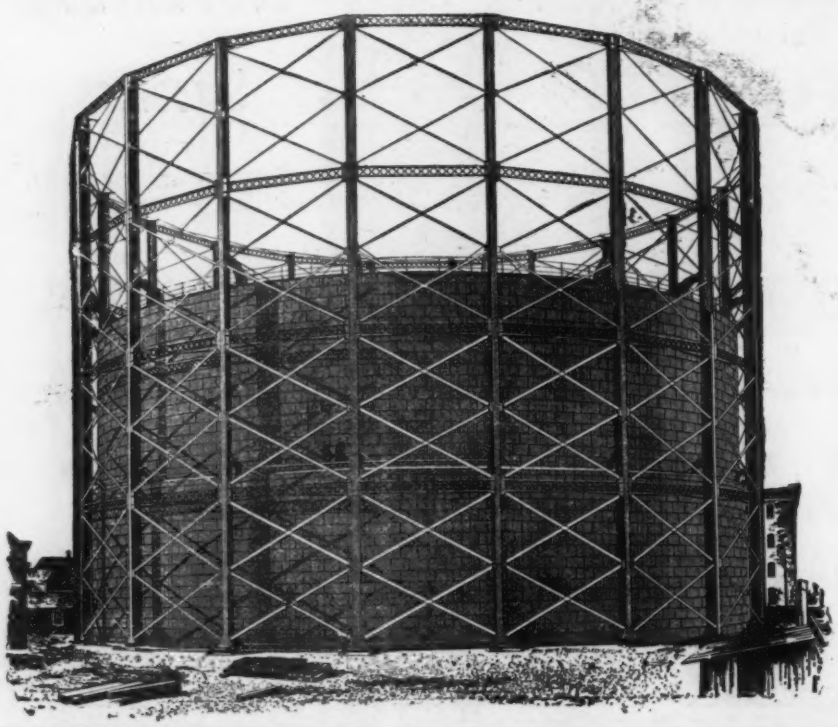

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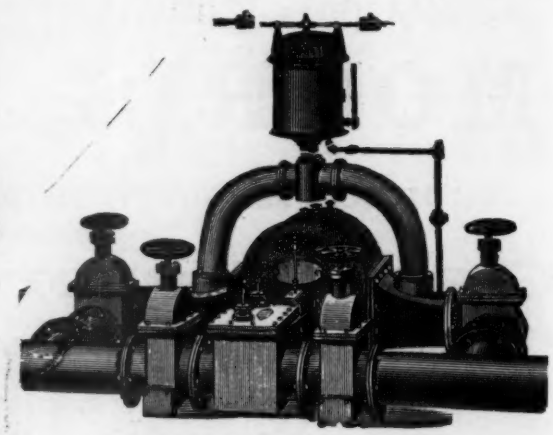

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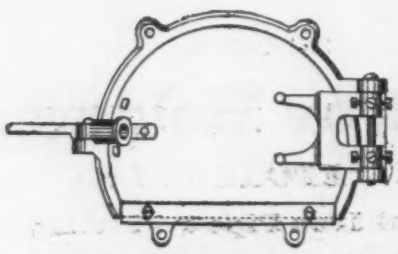

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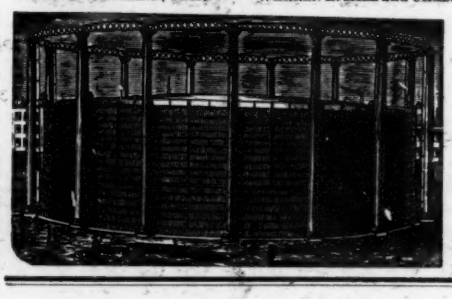
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Chester, Pa.	Little Rock, Ark.	Westerly, R. I.	Calais, Me.	Vancouver, B. C.
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Staten Island, N. Y.	South Boston, Mass.	Montclair, N. J.	West Chester, N. Y.	So. Framingham, Mass.
Saugerties, N. Y.	Rye, N. Y. (2)	Attleboro, Mass.	Bay Shore, L. I.	Woonsocket, R. I.
Clinton, Mass. (Lan. Mills)	Woodstock, Ont.	Santa Cruz, Cal.	Washington, D. C.	Simcoe, Can.
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GAS COOKING STOVE, No. 8 C.

SIZE.

Stove.	Oven.	Roaster.	Top.	Length over Extension Shelves,
37 in. high.	12 in. high.	12 in. high.	24 in. long.	36 in.
20 in. wide.	17½ in. wide.	18 in. wide.	21 in. wide.	
	12 in. deep.	13 in. deep.		

This Stove has four burners on top, and double oven burner.

Consumption of gas with all burners in use, 42 feet per hour, at 1 inch pressure.

The top is made in sections, so that a greater variety of cooking utensils may be used. By lifting out the covers and crosspieces and putting in a suitable forked ring, which is sent with each stove, a wash boiler or other large utensil may be set over two burners. Our **No. 87 GRIDDLE** also fits in the same position. The roasting oven is provided with a cast-iron door.

All Fittings are Nickel-Plated.

GAS COOKING STOVE, No. 7 B.

SIZE.

Stove.	Oven.	Roaster.	Top.	Length over Extension Shelves,
31 in. high.	9½ in. high.	10 in. high.	21 in. long.	32 in.
17 in. wide.	14½ in. wide.	15 in. wide.	16 in. wide.	
	12 in. deep.	13 in. deep.		

This Stove has three boiling burners in the Top or Hot Plate, and one single oven burner.

This cut represents our New Style Cooking Stove. As will be seen, it has an ornamented cast-iron Base and Front, and extension shelves. The Oven Burner, which is atmospheric (unless otherwise ordered), is of an entirely new and improved pattern (patent). The ovens are of greater capacity than those of the old style. The Top, in conjunction with the Outlet Pipe, is designed to carry off all the products of combustion, if desired, but they are also supplied with a loose ring which converts it into an ordinary open top stove.

The consumption of this Stove is 35 cubic feet per hour at 1 inch pressure, with all Burners in use.

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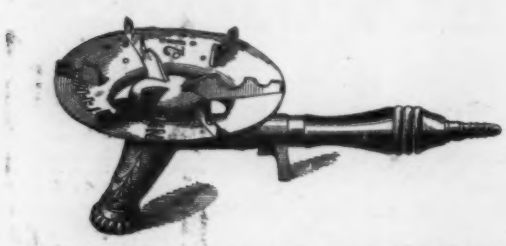

"RADIANT" BOILING STOVE, WITH REGENERATIVE BURNER.

Size, 6¼ inches diameter, 8 inches high. Consumption, 6 feet per hour at 1 in. pressure.

HOT PLATE, No. 111.

Size, 36 in. long, 12 in. wide, with three double burners, 6 taps.

Consumption, with all burners in use, 36 cubic feet per hour, with 1 in. pressure.

¾ in. supply pipe should be used where the pressure is 1 in. or over.